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VOL. I.—30TH YEAR. SYDNEY, SATURDAY, FEBRUARY 6, 1943. No. 6.

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SUPPLEMENT NUMBER 8 ON WAR MEDICINE AND SURGERY:
Chemical Warfare.

THE X-RAY LOCALIZATION OF FOREIGN BODIES.[1]

By E. W. FRECKER,
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IN a recent article[(1)] on the localization of foreign bodies covering only the English and American literature, 147 references were listed, and it was estimated that over 200 methods exist for this purpose. The fundamental problem of localization is relatively simple, especially as accuracy to within a centimetre is sufficient; but it has been confused by over-elaboration and a multiplicity of methods, most of which are unnecessarily complex. The present requirements from a military point of view are, firstly, simplicity so far as it is consistent with reasonable efficiency, and secondly, standardization, for in modern mobile warfare much of this work must be quickly carried out and is subject to the uncertainties of a rapidly moving campaign and to limited mobile equipment. Anyone who has seen a large casualty clearing station extended in full operation at the height of a battle, with the casualties ever exceeding the capacity of the surgical teams, will realize that there is no place, in the forward area at any rate, for anything but the most forthright methods.

The problem is not simply the localization of a foreign body, but the localization of many foreign bodies in a limited time, with limited materials and often under conditions of physical stress. Furthermore, the information obtained must be placed in the most easily understood and rapidly usable form before the operating surgeon. This in itself is a separate problem. Personal consultations according to the leisured methods of a metropolitan hospital will be the exception. Complete understanding must therefore exist between the surgical and X-ray units, and this can be established only by previous standardization of equipment, methods and instructions to personnel. Rapidity, efficiency and coordination cannot be established, as it were, "out of the hat", unless the ground has been previously prepared.

Further back at the base hospitals more elaborate methods may be used, but they are seldom necessary. In any case, here each problem can be studied at leisure, and the preferences of individual surgeons or radiologists can be consulted. It would seem better, however, to concentrate our standardization upon simple methods available anywhere, with the simplest forms of X-ray apparatus, and intelligible to all parties concerned with the least effort. Most of the rush work will be done by fluoroscopic methods, and therefore I shall briefly trace the development of a fluoroscopic method suited for local requirements, building it rapidly up from first principles for easy appreciation and discarding fine technical details which, however important they may be to the radiologist, are of no interest to the clinician.

GENERAL CONSIDERATIONS.

When the wounded soldier first comes under medical care, the treatment of hæmorrhage and shock or of possible perforated viscus takes precedence over other matters. The localization of the foreign body is of secondary importance, except in so far as its identification may assist in the diagnosis of the site or extent of the associated injury. If prompt surgical treatment is decided upon at the first operating centre, which will usually be the first X-ray centre also, exact localization is probably advisable in order that the foreign body may be removed during the operation. Generally speaking, wounds of the skull and thorax and fractures will be examined radiographically at the first opportunity as a necessity antecedent to treatment, and the films then taken may furnish all the localization necessary.

In addition, any patient who has been wounded should at one stage or other be placed upon the table and examined fluoroscopically from head to foot for fragments, so that the overlooking of unexpected and unknown injuries may be avoided. This entails no extra exertion, for the patient

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on November 26, 1942.

need not be lifted from the stretcher. This wide examination is also necessary since projectiles travel most unexpectedly and may lodge far from the site of injury.

In a recent instance a soldier was shot in the jaw near Kokoda by a Japanese sniper, and the bullet was finally removed from behind the liver. The missile tracked completely down through the neck and thorax without any skin puncture except that in the jaw.

The nature of the projectile determines its visibility. Heavy metals are clear and unmistakable on screen and film; but light metals such as aluminium are seen only with difficulty on the film and not at all on the screen. Among air-raid casualties, 50% of the victims in London had perforated injuries from flying glass. Fortunately plate glass, owing to its lead content, can be seen on a film, though it is invisible on the screen. Clothing and wood are translucent unless the latter is coated with lead paint, whilst gravel may or may not be seen. Air carried into the tissues may be visible and can be mistaken for early gas gangrene. A screen or film examination which reveals no abnormality can therefore be considered to exclude only heavy metallic fragments, and not all foreign bodies. One surprising thing is the frequency with which the tissues seem literally filled with small fragments, so diffuse that removal is impossible and localization is unnecessary. Luckily, these small fragments by reason of their small mass and kinetic energy do not penetrate far.

Methods of Localization.

Localization may be carried out by means of X-ray films or by the fluoroscope. Manifestly, where many patients have to be handled rapidly fluoroscopic methods are preferable; but in ordinary circumstances the taking of two X-ray films in planes at right angles to one another furnishes most of the information required, especially if each of the films shows a reference point on the skin which is apparent to the surgeon at the time of operation. Thus a small punctured wound may be indicated by the affixing of a small cross wire with adhesive plaster. The films then give level and depth from a known and visible point.

Even during a difficult operation two films may be thus taken with forceps gripping the fascia at the nearest known point to the foreign body; the surgeon may thus be reorientated if he has temporarily lost his bearings. The double film method, however, fails in the presence of multiple foreign bodies, for individual pieces appear to have different shapes in the two views and cannot be identified; thus all localizing value is destroyed. Here we must resort to stereoscopic films, which, when properly taken and viewed, give an excellent anatomical visualization of the parts. Care must be taken in setting the films up in their correct relations, or else, especially when a limb is involved, anterior and posterior positions may be confused. Stereoscopy is particularly valuable in X-ray examinations of the skull, pelvis, thorax and abdomen, for in addition to revealing the position of the foreign bodies, the method clearly shows the relations and position of accompanying skeletal injuries.

Rarely the visualization of other organs by opaque media may be necessary. Once or twice I have injected barium into the bowel or sodium iodide into the bladder to determine the relative position of a fragment.

But most military work will be done by fluoroscopy. The accepted method is to place a skin mark vertically over the foreign body and to give the depth beneath the mark at which the foreign body lies. Sometimes a second mark may be placed laterally to give the horizontal level of the object. This is geometrical localization as opposed to anatomical localization. The radiologist must, however, always attempt to describe the anatomical location of any projectile, in addition to giving a mere geometrical reference. An attempt to correlate the depth with the anatomical structure has been made in the "U.S.A. Army X-Ray Manual". In this the average depths of various structures are listed. Obviously a close acquaintance with cross-sectional anatomy will be very useful for this purpose.

The exact anatomical localization of the foreign body is the most important function of the radiologist and the most difficult. Obviously, it is all-important to the surgeon planning his surgical approach. The surgeon must know, for example, whether a superficial foreign body lies inside the skull or merely in the scalp. This simple fact is often not apparent even on two X-ray films, owing to the rounded shape of the cranium, and films must be directed tangentially to the injured area to solve the problem. Incidentally, these tangential films are necessary in any case to exclude depressed fracture.

Again, the situation of the foreign body, whether above or below the diaphragm, and whether inside or outside the thorax, is all-important. The relationship to the surrounding viscera may determine the nature of the operation and may even contraindicate any attempt at removal at all. These relationships should therefore be decided as far as possible. All these anatomical problems can be decided only on the basis of the radiologist's anatomical knowledge. His data are derived from fluoroscopic examination, and from the usual two radiographic views taken at right angles to one another, together with such specially directed or tangential films as may be considered necessary.

Fluoroscopic Methods.

When a foreign body is seen on the fluorescent screen, the foreign body itself, the focal spot of the X-ray tube and the image of the foreign body must all lie in a straight line. If now the tube is moved to one side, the image of the foreign body changes its apparent position, owing to parallax. The nearer the foreign body lies to the screen, the less is the apparent motion, and *vice versa*. These are the fundamental facts upon which the geometrical localization of foreign bodies is based.

Parallax.

Parallax may be shortly defined as the apparent change in position of an object due to change of viewpoint (Figure I). This phenomenon of parallax can be used during a

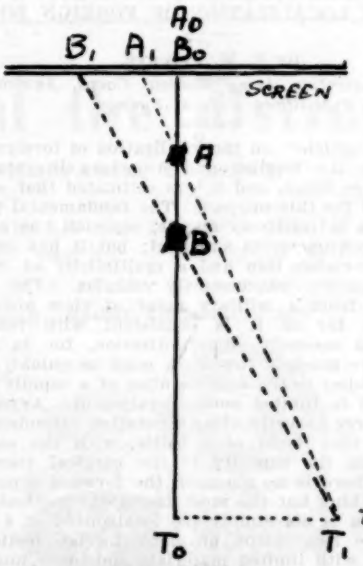

FIGURE I.

Illustrating the effect of parallax on two foreign bodies *A* and *B*, when the tube is moved from T_0 to T_1.

fluoroscopic examination to determine the relative depths of two particles or of a particle and an anatomical landmark, such as the shaft of a bone. On traversing the tube, the particle which moves less than the other lies nearer the screen; or if the relative motion of two objects is considered, the one nearer the screen appears to move with the tube, and the other one against it. If the degree of apparent motion of two objects is equal—that is, if their

relative positions are unchanged—then they must lie at the same level.

An opaque pointer touching the periphery of the part can by this method be rapidly adjusted to the same level as the foreign body. Combined with this, one may gently prod the soft tissues with the pointer, working vertically along the lateral aspect of the part, watching the foreign body as one does so. At one point it will be seen that the communicated motion of the foreign body is greatest. This is the nearest point, and it will be found to coincide with and confirm the level determined by the parallactic method. A lateral skin point placed here to show the level of the fragment and an anterior skin point immediately under the image of the foreign body will constitute a complete localization without scales or figures or written reports. The essential features here and in all localizations is that the position of the patient is clearly specified or understood and that it can be conveniently reproduced by the surgeon at operation; otherwise the geometrical conditions are not reproduced. The ideal is to localize the fragment in the operating position. If multiple foreign bodies are present, different skin markings should be employed for each fragment to avoid confusion (Figure II), and the mark may be coupled in the report with the depth measurement in centimetres.

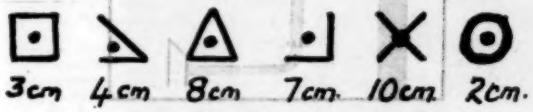

FIGURE II.
Suggested types of skin mark.

This parallactic and nearest point method[1] is suitable for limbs mainly, and we may now consider a simple depth localization.

The Single Shift Method.[1]

The necessary conditions of apparatus in the single shift method embody a fixed screen, not linked with the tube, a known and fixed tube-screen distance, and a tube moving horizontally and independently of the screen for a known horizontal distance.

The foreign body (F) is localized vertically on the screen by closing the shutters to a small square (Figure III). The

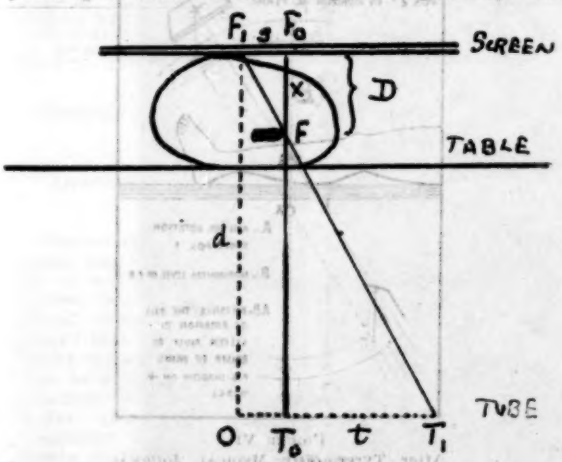

FIGURE III.
Geometry of single shift method.

image F_0 is marked on the screen and an indelible mark (X) is placed also on the skin surface. Special skin inks can be used,[1] but a ready substitute is an indelible pencil dipped in alcohol to form methyl iodide.

[1] Pyrogallic acid	5·00 parts
Strong ferric chloride solution	10·00 parts
Methylated spirits	50·00 parts
Acetone to	100·00 parts

If now the tube is moved a known distance (t) from T_0 to T_1 (Figure III) the image F_0 moves to F_1. The distance from F_1 to F_0 is measured and bears a constant relation to the required depth F_0F. For given conditions a scale can be calculated to measure F_1F_0 directly on the screen in terms of F_0F so that no calculation is required.

The geometry of the method is as follows:

FF_0F_1 and F_1T_1O are similar triangles.

$$\text{Therefore } \frac{F_1F_0}{F_0F} = \frac{OT_1}{OF_1} = \frac{OT_0 + T_0T_1}{OF_1}.$$

$$\text{That is, } s/D = \frac{t+s}{d}$$

$$D = \frac{sd}{t+s}$$

where D = depth of foreign body, s = image shift, t = tube shift, d = tube-screen distance.

After the estimation of D, the screen-skin distance F_0X must be ascertained and subtracted; this gives the true depth of F. The single shift method is obviously capable of adaptation to radiographic methods with a double exposure before and after tube shift on a single film.

The necessary fixed tube-screen distance is a handicap in most apparatus, and to eliminate this necessity a further somewhat more elaborate method was evolved—the double shift method.

Strohl's Double Shift Method.[1]

The necessary condition of apparatus in the double shift method embodies a fixed screen, not linked with the tube, an independent tube moving horizontally, and markers or wires fixed in a given relation to the tube focus. One thus exchanges the known screen distance for a small apparatus affixed to the tube. Two wires are fixed in such a relation to the tube focus that the distance between the wires forms the base of an isoceles triangle whose apex is the focus (triangle T_0WW). The dimensions are such that the ratio of base to altitude of the triangle is known (2:3 in the original method).

The procedure is as follows (Figure IV). First the foreign body is centralized as before at F_0 and a mark is

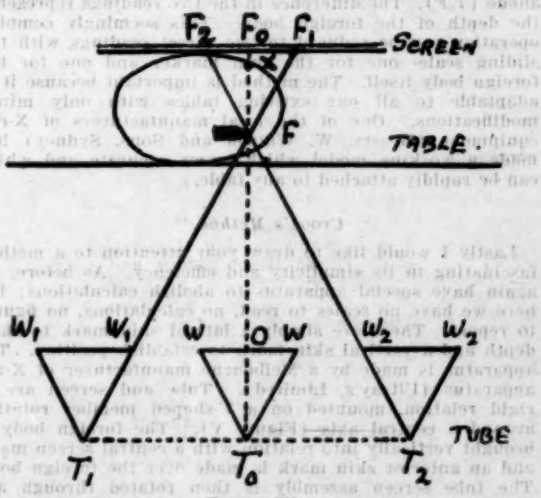

FIGURE IV.
Geometry of the Strohl and of the modified Strohl method.

made on the skin at X, but not on the screen. The tube is then moved towards T_2 till the image of the wire W_2 coincides with that of the foreign body at F_0. This point is marked on the screen. Similarly at F_1 with the other wire F_1 is located and marked by moving the tube to T_1. The distance from F_2 to F_1 is measured, and this distance bears a constant relation to F_0F.

The geometry of the method is as follows:

F_2F_1F and WWT_0 are similar triangles.

$$F_0F/F_2F_1 = OT_0/WW$$
$$= 3/2$$
$$F_2F = 3/2\ F_2F_1$$

Depth = 3/2 shift of image.

A scale can be constructed as before to make direct measurements in terms of the required depth. Allowance for screen-skin distance must also be made.

Strohl's method is probably the best known of all; but most of our apparatus in Australia carries a tube permanently linked with the screen, and we must modify this method to suit our local requirements. Once again an additional apparatus is required to remove another limitation—in this instance, a scale on the table and a pointer on the fluoroscopic carriage.

The necessary condition of apparatus for this modified Strohl's method now embodies tube and screen linked together at any tube-screen distance, or separated at will, wire markers fixed in definite relation to tube focus, measuring scale on the table and pointer on the fluoroscopic carriage to measure tube movement. By this method we measure tube movement, but not shift of image, and thus estimate the distance of the foreign body from the tube anode instead of from the screen.

Modified Strohl's Method.[9]—If we revert to Figure IV, the triangle FT_1T_2 is similar to WWT, and therefore the relation of $T_1T_2/T_0F = 2:3$. Thus if we measure T_1T_2 on our scale, we can immediately calculate T_0F, or better still, we can construct our scale to read directly in values for T_0F. First we centralize our foreign body as before (T_0FF_0), and place a lead marker accurately on the skin at X. The next step is to determine the distance of the skin marker from the tube anode. The marker is made to coincide on the fluoroscopic screen, first with one wire, then with the other, at the tube positions T_1 and T_2 respectively. The tube movement between these two position is measured on the scale directly in terms of the anode-marker distance (T_0X), the scale being calibrated accordingly. To save double readings, the scale slides to a zero stop on one side of the tube movement. This operation is similarly repeated to find the distance of the foreign body from the tube anode (T_0F). The difference in the two readings represents the depth of the foreign body. This seemingly complex operation can be reduced to two direct readings with the sliding scale—one for the skin marker and one for the foreign body itself. The method is important because it is adaptable to all our existing tables with only minor modifications. One of the local manufacturers of X-ray equipment (Messrs. W. Watson and Sons, Sydney) has made a working model which seems accurate and which can be rapidly attached to any table.

Crook's Method.[10]

Lastly I would like to draw your attention to a method fascinating in its simplicity and efficiency. As before, we again have special apparatus to abolish calculations; but here we have no scales to read, no calculations, no figures to report. There are simply a lateral skin mark to show depth and a vertical skin mark to establish position. The apparatus is made by a Melbourne manufacturer of X-ray apparatus (Ultray's, Limited). Tube and screen are in rigid relation, mounted on a U-shaped member rotating around a central axis (Figure V). The foreign body is brought vertically into relation with a central screen mark, and an anterior skin mark is made over the foreign body. The tube screen assembly is then rotated through any convenient angle, usually 30° (Figure VI). If the axis of rotation passes through the foreign body, the mark and the image of the foreign body will remain unchanged; if they alter their relative position, then the whole assembly is raised or lowered to bring them back into coincidence. The horizontal axis of rotation is then on a level with the foreign body and passes through it. A metal rod is pulled out in prolongation of this axis to mark the skin at the lateral level. The intersection of the vertical and horizontal lines from the two skin markings then represents the position of the foreign body. A figure for the depth can obviously easily be measured directly if required.

I have not been able to try this method, but Major Tyrer states in his article that it was used with great success for over 2,000 operations in an Australian general hospital overseas. For general use it would seem the apparatus of choice.

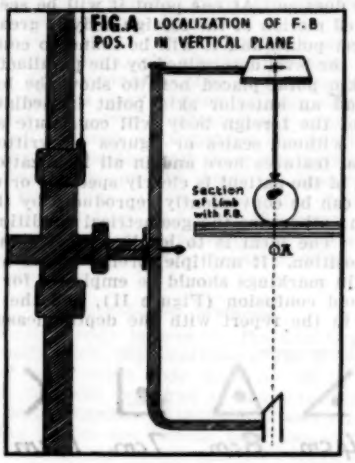

FIGURE V.
After Tyrer, THE MEDICAL JOURNAL OF AUSTRALIA, April 25, 1942.

Fluoroscopic Assistance at Operation.

Fluoroscopic assistance at operation is useful, but often disappointing. It is not often necessary and should not be encouraged as a routine measure. It is often unsatisfactory, since both surgeon and radiologist have to compromise on their ideal conditions with regard to light, asepsis, mechanical facilities and protection. The exposure to patient, surgeon and radiologist is excessive, if it is

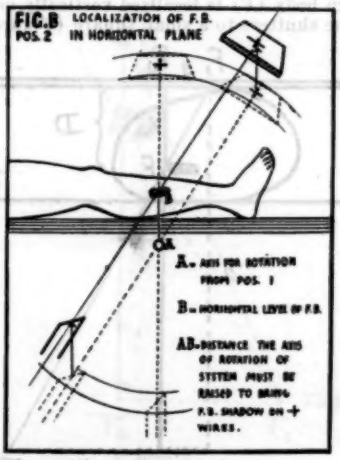

FIGURE VI.
After Tyrer, THE MEDICAL JOURNAL OF AUSTRALIA, April 25, 1942.

prolonged or repeated too often. If fluoroscopy is so used, it should be a cast-iron rule that no X rays be turned on when the surgeon's hands are in the field whether the surgeon wishes it or not, for in latter years, surgeons have sustained many more injuries from X rays than radiologists or patients, mostly during operative work. The bonnet fluoroscope usually recommended for fluoroscopic work should be discarded as a dangerous instrument.

Biplane Fluoroscopy.

Biplane fluoroscopy may be mentioned for use in extremely difficult circumstances. The use of perforating needles at right angles (or forceps) leading to the foreign body is an excellent expedient in good hands. The proper apparatus is likely to be available only in large hospitals, but it may be rigged up in an emergency from two portable shock-proof units and two screens.

Conclusion.

In conclusion, it seems to me that we should standardize our instruction, our methods and our apparatus now against the day when we may possibly be asked to deal with penetrating injuries and foreign bodies in large numbers, so that technicians, radiologists and surgeons can step promptly into a full stride of efficient cooperation without preliminary experimenting and delay. The modified Strohl apparatus would seem best for attachment to ordinary X-ray tables, or the Crook's apparatus where the special apparatus can be issued and adapted.

A list of references is appended for the benefit of those who require more detail than this outline is able to give. It is selective only; but the articles selected contain references to most of the literature.

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(10) T. L. Tyrer: "A New Method of Radiological Localization of Foreign Bodies", THE MEDICAL JOURNAL OF AUSTRALIA, April 25, 1942, page 493.

FOREIGN BODIES IN RELATION TO WAR WOUNDS.[1]

By R. V. GRAHAM,

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FOREIGN BODIES in relation to war wounds in the human frame may be derived from any substance which has been set in motion, directly or indirectly. The most common motive force is an explosive of some form, although the actual impetus of the foreign body which causes the wound may be derived only indirectly from the explosive. Those whose momentum is directly due to the explosive may be grouped in the following manner: (*a*) those with relatively high velocity, such as the rifle or machine-gun bullet; (*b*) those with relatively low velocity, such as fragments from high-explosive shells, shrapnel, mortar-bombs or grenades. Fragments of clothing, coins, trouser-buttons and glass or splinters of wood are also of relatively low velocity, as they are activated only indirectly by the explosive force. By virtue of their lower velocity, foreign bodies of the second class are more frequently retained than those with higher velocity.

The high-velocity missiles, with some notable exceptions, produce less damage to the subject than those with lower velocity. The rifle bullet fired from a distance greater than 200 yards will frequently penetrate a bone or joint, leaving relatively little destruction in its path, owing to the fact that its flight has been stabilized about its long axis by virtue of the rotation imparted by the rifling grooves in the barrel. A rifle bullet in a similar state of stabilized flight may, however, inflict mortal damage by penetrating the spinal cord or a large blood vessel. A rifle bullet fired at a distance of less than 200 yards has not settled down to such stabilized flight, as the base of the bullet has a rotary motion about the point, and thus it tends to inflict more serious damage on the tissues, particularly when it strikes a resistant tissue such as bone or a solid viscus.

The higher velocity missiles are less likely to be contaminated by dirt and bacteria derived from fragments of clothing, owing either to their power of penetrating without undue laceration, or to the heat derived from their greater velocity. On the other hand, the missiles with lower velocity are accompanied by greater laceration of tissue, are more frequently retained in the tissues, and are more commonly associated with grave sepsis.

Dangers of Foreign Bodies.

Foreign bodies in war wounds are associated with various dangers, which may be classed as (*a*) immediate and (*b*) remote.

Immediate Dangers.

Immediate dangers are associated with the nature and extent of tissue damage rather than with the mere presence of the foreign body. Thus cases are observed in which a single wound from a rifle or machine-gun bullet has the following results: (i) division of important blood vessels, such as the popliteal artery and vein, leading to fatal hæmorrhage or gangrene of the limb; (ii) division of the spinal cord, resulting in paraplegia and ultimate death; (iii) perforation of a hollow or solid viscus, followed by hæmorrhage or sepsis. On the other hand, the immediate dangers of a single high-velocity missile may be relatively minimal, for example: (i) penetration of soft tissues without damage to any important structure; (ii) partial or complete severance of a nerve trunk; (iii) compound fracture of one or more bones.

Lower velocity missiles are more likely to inflict multiple injuries with a greater degree of laceration of tissue, and so are apt to be associated with more grave immediate dangers, such as evisceration and death from hæmorrhage, in addition to the above-mentioned.

Remote Dangers.

Remote dangers associated with foreign bodies are sepsis and mechanical interference with function.

It has been mentioned that the danger of sepsis is greater with the low-velocity missiles, which have a greater tendency to carry in fragments of soiled clothing, than with the high-velocity missiles. This danger has received more attention in recent wars than any other, and reference will be made to it in a subsequent part of this paper.

It is worthy of note that foreign bodies in the gluteal region or in the adductor region of the thigh are especially apt to be associated with anaerobic infection, and removal of relatively small foreign bodies in these situations has been followed by fatal gas gangrene, both in civilian and in military practice.

Mechanical interference with function caused by foreign bodies is especially noticed in the following circumstances: (*a*) in central nervous tissue, where destruction of brain or spinal cord is irretrievable; (*b*) in laceration or compression of peripheral nervous tissues, when recovery is prolonged or rapid according to the degree of damage, the promptness of treatment and the presence or absence of sepsis; (*c*) in joints, where a retained foreign body produces gross secondary changes; (*d*) in the abdomen, where adhesions are prone to follow such a wound if the patient survives; (*e*) in blood vessels, where pressure of a foreign body may result in subsequent ulceration with secondary hæmorrhage or arterio-venous aneurysm. In a certain number of these cases the mere presence of the foreign

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on November 26, 1942.

body has been followed by functional or hysterical manifestations.

Pathological Changes.

Apart from sepsis, which will be mentioned later, the prominent pathological changes following the presence of foreign bodies in the tissues are characterized by a greater or less degree of fibrosis, and sometimes by necrosis.

In wounds of muscle tissue in man, the divided portions are never united by newly formed muscle, but always by fibrous tissue. Extensive laceration of muscle with separation of the divided ends during the healing process naturally influences the amount of scar tissue, with proportional disability from this source after healing.

Peripheral nerve regeneration is also influenced by the degree of laceration and the extent of separation of divided ends during the stage of fibrosis.

The development of periarticular or intraarticular fibrosis with subsequent fibrous ankylosis again depends largely on the extent of the damage by the foreign body.

Fibrous adhesions are prone to occur in serous cavities following such injuries.

Tangential injuries to the ends of long bones may result in necrosis and sequestration of fragments, which are not obvious until after this stage of fibrosis.

Peripheral nerve injuries cause a greater or less degree of interference with function from hyperæmia according to the proximity of a foreign body which has not actually lacerated them.

Large blood vessels which have not been actually lacerated may subsequently ulcerate if a foreign body remains in contact with them, and the result may be secondary hæmorrhage or an arterio-venous aneurysm.

A foreign body remaining in contact with a hollow viscus may subsequently ulcerate into the viscus.

The foreign body may become completely encapsulated in fibrous tissue.

But the perpetuation of sepsis, which may indirectly result in most of the above-mentioned complications, is one of the most important results of a retained foreign body in the tissues, and the underlying aim of treatment is to anticipate these effects by removal of the foreign body at the earliest opportunity consistent with safety.

Many instances have been observed in which compound fractures have rapidly united in spite of the presence of single or multiple foreign bodies, which may even be included in the new bone produced at the site of fracture; but these cases must not make one overlook the many instances of varying degrees of sepsis associated with the presence of foreign bodies in the tissues resulting in delayed healing, ulceration of vessels or viscera, cellulitis or osteomyelitis, with prolongation of disability.

Treatment.

The ideal treatment is that which results in the earliest possible removal of the foreign body, and the provision of adequate drainage, in order to anticipate the effects of sepsis. The latter step is of much greater importance than the actual removal of the foreign body, which in certain cases may be embedded in tissues in such a position that removal may result in greater disability than will follow if it is left embedded in tissue which has not been infected by it. Such a case is at present under observation; a large piece of metal, after penetrating the lateral condyle of the femur, came to rest in the postero-medial aspect of that condyle in such a position that it could be approached only through the posterior aspect of the knee-joint, with gross interference with stability of the knee-joint. In similar cases, in the absence of any sign of sepsis, it seems wise to avoid such destructive surgery.

The optimal time for removal of the foreign body is at the primary operation, when, in accordance with principles advocated by many French surgeons, the wound is enlarged for exploration (*débridement*), and then all necrotic and infected tissues, including the track of the missile, are excised (*épluchage*); the missile is thus exposed and its removal is facilitated. The objects of this wide excision of tissue are threefold: (*a*) to prevent sepsis, (*b*) to minimize subsequent fibrosis, (*c*) to remove foreign bodies.

Before the widespread use of the sulphonamides in the early local treatment of war wounds, it was considered that such excision must be carried out within twelve hours of injury to be effective in preventing subsequent infection. But experience with the sulphonamides as local wound dressings at Pearl Harbour indicates that the wound may be excised with safety as late as seventy-two hours after injury (that is to say, foreign bodies may be removed up to that period), provided that the wound has been dressed with sulphanilamide within the interval between injury and excision.

Anatomical considerations may prevent excision of the wound and the infected tissues *en masse* at this primary operation for removal of the foreign body. In such cases the missile should be extracted after excision of as much infected tissue as possible, the whole wound should be well swabbed with acriflavine solution, and no sutures or plug should be inserted. If the foreign body has not been removed during this early period, granulation tissue forms along the track of the missile. This granulation tissue has been shown to be an effective barrier against invasion of tissues by microorganisms, and foreign bodies remaining in the tissues during this intermediate stage should be left undisturbed until granulation tissue has matured. This pathological fact underlies the principle of rest, which has become so universally recognized in the treatment of such wounds.

When for any reason the missile has not been removed at the end of two or three weeks after injury, a localized abscess may develop in the track of the foreign body; in this case the abscess is usually a good guide to the foreign body, which may be removed during evacuation of the abscess.

Removal of foreign bodies when sepsis is established is associated with the danger of opening up new paths of infection and of auto-inoculation from the septic wound. As the foreign body may be responsible for perpetuating the infection in some cases, it is necessary (*a*) carefully to localize the foreign body before operation, (*b*) to avoid undue manipulation of tissues, (*c*) to avoid prolonged searching for the foreign body, (*d*) to apply sulphanilamide or acriflavine solution to the septic area, and (*e*) to avoid sutures after operation.

But in many cases, particularly if care has been observed in establishing adequate drainage at the primary operation, the wound will be healing without localized suppuration, and the question of removal of the foreign body at the time of election arises.

The best guide to the forming of an opinion in these cases is the rule made by Harvey Cushing regarding removal of foreign bodies from the brain, namely: (*a*) superficial and accessible foreign bodies should always be removed; (*b*) foreign bodies which are lying in deep structures should always be removed, provided this can be accomplished without increasing the damage already done.

Late Removal of Foreign Bodies.

It is in cases in which late removal is undertaken that careful localization of the foreign body prior to operation is of great help to the surgeon, although it is not always imperative, provided skiagrams have been taken in two planes at right angles, which demonstrate the foreign body in relation to anatomical landmarks.

In theory it is easy to localize such bodies and to remove them; but in practice, owing to several variable factors, the skill of the surgeon may be taxed if he is to remove the foreign body without inflicting damage on healthy tissues. Prior to the institution of a search for the foreign body, an approach through anatomical planes should be planned with due regard to the original track of the missile and the structures to be preserved.

One of two methods of approach will be available. The first will be through the original track of the missile. Exploration by probe or scoop may locate the foreign body and permit of its removal. In such cases, it will be necessary to enlarge the wound of entrance, and when the

foreign body has penetrated deeply, a counter-incision to facilitate extraction or to provide subsequent drainage may be necessary. A skilful surgeon will not find much aid in the use of the fluoroscope in the operating theatre. The general principle in these cases is to keep to the track of the missile, to excise necrotic tissue, and to provide free drainage.

The second method of approach is through a fresh incision, which aims at removing the foreign body without laceration of granulation tissue in the original track of the missile. This method is particularly applicable to those cases in which adequate drainage was established early, and in which repair has progressed without subsequent localized abscess or cellulitis. The following are principles of value in the procedure: (i) The incision should be planned to reach the missile by the shortest possible route, with regard to its position and to that of important structures in the vicinity. (ii) A search should be made for fragments of cloth as well as for the missile. (iii) Exposed vessels, if lacerated, may require ligature. (iv) Divided nerves should be approximated if possible by a few fine silk sutures, in order to facilitate regeneration with a minimum of scar tissue.

The removal of the missile is not the end of treatment. It must be remembered that the cavity in which the foreign body lies frequently harbours virulent microorganisms, and efforts must be directed towards sterilization of the cavity. For this purpose the sulphonamides are probably most reliable, and some workers do not hesitate to close the wound after packing sulphanilamide into the site of the foreign body. Acriflavine has not been displaced completely from its former preeminent position as a tissue antiseptic, and should be used when an antiseptic that has a prolonged action when mixed with serum is indicated. If there is any doubt about the efficiency of efforts to sterilize the cavity, counter-drainage should be provided before the wound is closed.

Removal of Foreign Bodies after Complete Healing of the Track of the Missile.

When a foreign body is to be removed under aseptic conditions after the track of the missile has completely healed, previous localization by X-ray examination is imperative. This should be completed before operation, as attempts to use fluoroscopic examination at the time of operation are fraught with risks of superadded sepsis.

Complications.

The complications following extraction of foreign bodies are (*a*) secondary hæmorrhage, which is apt to ensue if the missile has been lying close to a large vessel, (*b*) cellulitis or septicæmia, owing to activation of a latent infection, and (*c*) anaerobic infection.

All of these emphasize the obvious advantages of removing the foreign body at the primary operation, if possible prior to the onset of suppuration.

THE PLACE OF QUININE IN THE TREATMENT OF SUB-TERTIAN MALARIA.

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Is quinine dangerous in sub-tertian malaria? Will quinine precipitate an attack of blackwater fever in sub-tertian infections? These are important questions. They have been discussed for years, yet no finality has been reached.

During the latter part of 1940 an outbreak of blackwater fever occurred in the area in West Africa for the health of which I was responsible. The outbreak and the attendant circumstances were unusual.

The case histories and general description of prevailing conditions follow.

Reports of Cases.

CASE I.—The patient was a male Syrian, aged thirty years, who had spent seven years on the Gold Coast. He had taken quinine irregularly. The date of onset of his illness was September 7, 1940. He passed black urine on September 7, 1940. Medical aid was not called until September 11. I was informed that he had passed black urine four days before, after having taken four tablets of quinine (20 grains), and that he had continued to pass dark urine.

When I examined him, he was gravely ill. He continued to have crises of blood destruction, and died two days later.

The cause of death was anoxæmia. Very little could be done for this man; owing to the family's having ideas of its own with regard to treatment, it was not possible to remove the patient to hospital.

CASE II.—The patient was a male African, aged ten years, who had lived all his life on the Gold Coast. He had taken quinine irregularly. The date of onset of his illness was October 16, 1940. On the morning of October 17 the boy was brought to hospital. He had passed dark urine the day before, after having been given one drachm of *Mistura Quininæ Sulphatis* (five grains to half an ounce of water). His temperature was 100° F. and his pulse rate was 100 per minute. He had had quinine at irregular intervals throughout his life.

He had a moderate degree of red cell anæmia. Sub-tertian malaria parasites were present. He was given tablets of "Atebrin", 0·1 gramme twice a day. The urine was made alkaline within a few hours; he took sodium bicarbonate solution with milk and glucose well by mouth.

The urine cleared within twenty-four hours; no blood cells, but only granular debris, were present in the specimens. His progress was uneventful until October 26, when it was decided to try him with quinine in preparation for his discharge from hospital. No parasites were found in the blood. He was given two drachms of *Mistura Quininæ Sulphatis* at 10 a.m.; at 12 noon his temperature rose to 101·5° F. and his pulse rate was 98 per minute. At 12.20 p.m. he passed dark urine. The administration of quinine was stopped, and that of "Atebrin" was resumed. He continued to pass dark urine for forty-eight hours, after which his recovery was uneventful. He was discharged from hospital on November 26, 1940.

CASE III.—The patient was a male African, aged four years, who had lived all his life on the Gold Coast. Quinine had been taken irregularly. The date of onset of his illness was October 23, 1940.

The child was admitted to hospital on October 24, 1940; he had passed dark urine the day before, after having been given a small dose of quinine. On his admission, he passed dark urine. His temperature was 101·6° F. and his pulse rate was 120 per minute. Sub-tertian malaria parasites were present. He had a moderately severe degree of red cell anæmia. He was given tablets of "Atebrin", 0·1 gramme night and morning. The urine cleared during the evening of October 25. Sodium bicarbonate solution, 5% glucose solution and milk, were taken well by mouth. He had an uneventful recovery, and was discharged from hospital on November 13, 1940.

CASE IV.—The patient was a female African, aged twenty-three years, who had lived all her life on the Gold Coast. She had taken quinine irregularly. The date of onset of her illness was November 12, 1940.

She was admitted to hospital on November 13, 1940; she had passed dark urine the day before, after having taken quinine. Her temperature was 100° F., her pulse rate was 96 per minute. Sub-tertian malaria parasites were present. The number of red cells in the blood was little below normal. She was given tablets of "Atebrin", 0·1 gramme three times a day. She was able to take sodium bicarbonate solution, 5% glucose solution and milk well by mouth. The urine became alkaline within eight hours; it became clear about midday on November 14, 1940.

She made an uneventful recovery, and was discharged from hospital on November 26, 1940.

CASE V.—The patient was a male Syrian, aged nineteen years, who had spent two years on the Gold Coast. He had taken quinine irregularly. The date of onset of his illness was December 12, 1940.

This young man was admitted to hospital on December 11, 1940. He was suffering from a severe urticarial rash, and also from a Neisserian infection of the urethra. His temperature was 100° F. and his pulse rate 106 per minute. He looked very ill. Examination of the blood revealed a

pronounced red cell anæmia. Sub-tertian malaria parasites were present. He was given half a grain of calomel every half hour for four doses, followed by *Mistura Alba* in six hours. He passed tapeworm segments in the stool. *Mistura Quininæ Sulphatis* (five grains to half an ounce of water) was given three times a day.

His temperature dropped to normal the same evening; his pulse rate was 100. At 6 a.m. on December 12 his temperature was normal and his pulse rate was 96 per minute. At 4 p.m. on this day his temperature rose suddenly to 103·2° F. and his pulse rate to 118 per minute. He passed dark urine. The administration of quinine was stopped, and "Atebrin" was given (0·1 gramme three times a day). Fluids—sodium bicarbonate solution, milk and 5% glucose solution—were taken well by mouth.

He continued to pass dark urine until the morning of December 13. A further crisis of blood destruction occurred towards the evening of December 13; his temperature was 103·4° F. and his pulse rate 116 per minute. He became critically ill. During the morning of December 14, his urine became clear in colour, and it remained so. The patient complained of severe pain on passing urine. This was due to the urethral inflammation. Treatment was started for this condition on December 19. Tablets of "M & B 693" (0·5 gramme) were given by mouth at gradually increasing intervals (one hour, one hour, one hour, two hours and four hours). Centrifuged specimens of the urine contained no pus or diplococci on the mornings of December 28 and 29. The tapeworm head was passed after treatment with "Bedermin". The patient was discharged from hospital on December 31, 1940. He was given "Campolon", two cubic centimetres per day for seven days, followed seven days later by a depot injection of ten cubic centimetres given intramuscularly. He has remained well.

General Discussion.

The cases occurred in a coast town facing the Gulf of Benin (British West Africa). The town has a population of about 12,000 Africans, 25 Europeans and four Asiatics. The wet season lasted from June to September. The rainfall in 1940 was 10% above the average. The number of wet days was above average, so that most favourable conditions for mosquito breeding were present.

The anti-malarial measures taken to protect the town were not so efficient as they might have been, owing to the employment of staffs on war work and a large increase in administrative work.

During the year large numbers of African troops, with European officers, were camped within two miles of the town. The camps were sited to windward and northward of the town, so that uninfected mosquitoes arrived among the troops. The huts were inspected daily and adult mosquitoes were destroyed; that is to say, only a small number of mosquitoes survived long enough to develop and spread infection. Owing to swamp formation it was not possible entirely to prevent mosquito breeding.

Infections of sub-tertian malaria occurred in not a few African and European troops. No case of blackwater fever occurred among the troops. Infections of sub-tertian malaria occurred also commonly among the usual inhabitants, including Europeans and Asiatics. All the foregoing infections were treated with quinine, and the patients did well.

The early indications that all was not well with the local population were the following.

1. During July, August and September there was an increase in the incidence of enlargement of the spleen amongst African infants; it rose from 20% or 30% to 50% or 60%.

2. The great majority of infections were of sub-tertian malaria, with *Plasmodium falciparum*.

3. There was an increase in the prevalence of anophelenes.

It was possible to predict that cases of blackwater fever would occur. The chief factors for the production of such an outbreak were present,[1] namely: (i) a predominance of the parasite *Plasmodium falciparum* in a given area, (ii) hyperendemic conditions resulting in continuous infection and reinfection, (iii) a non-immune populaton residing in such areas, imperfectly protected against the bites of anophelenes, and (iv) intermittent and imperfect methods of taking quinine.

Cases of blackwater fever were restricted to those subjects who, living in the same area as Europeans and normally resident, employed no protection from mosquitoes and took quinine irregularly. The Europeans and some Africans, on the other hand, clothed themselves correctly, wore mosquito-boots at night, slept under nets and took prophylactic doses of quinine (five grains per day). Yet all the African patients who suffered from blackwater fever had been resident in the neighbourhood for years and it may be assumed had developed some degree of immunity.

I suggest that owing to lack of protection the weight of infection was one contributing cause for the fact that sub-tertian infections in these cases became complicated by blackwater fever.

J. C. Thomson and Alexander Robertson[1] make the following statement:

> Work on the blood of malarial and blackwater fever cases had demonstrated that in both conditions there exists an intravascular hæmolysis, but in the latter the hæmolysis is greater in amount and overflows the renal threshold.

In four of the above-mentioned cases of blackwater fever, sub-tertian malaria parasites were found. In all cases, the passing of dark urine was preceded by the taking of quinine. Not one patient used quinine regularly as a prophylactic measure.

I suggest that the giving of quinine in the above-mentioned cases was the determining factor in bringing about the blackwater fever.

W. Yorke[2] quotes from E. D. W. Greig and A. Neil the following summary of their work and the conclusion drawn:

> 1. *Reticulocytes.*—The reticulocytes were innumerated in a series of cases of malarial infection and the results recorded.
>
> In all cases an increase in number of reticulocytes followed, at varying intervals, the administration of specific drugs, quinine and plasmoquin.
>
> In a non-malarial case in which full doses of quinine had been given for fourteen days no increase in the number of reticulocytes was observed.
>
> It would appear that administration of quinine in malarial infection brings about an hæmolysis followed by an erythropoiesis, and this condition tends to support the well-known view that under certain conditions quinine may be a factor in precipitating an attack of Blackwater Fever.

Conclusion.

An outbreak of blackwater fever occurred in an area in which Europeans, Syrians and Africans lived. There were European and African military personnel and civilians. Sub-tertian malaria was prevalent. All the patients were Syrian or African in race and of civilian class; none could be described as non-immune. All the patients had neglected to take ordinary protective measures against malaria. All took quinine or were given quinine at irregular intervals.

On the facts observed, it would appear that quinine may be employed in the treatment of sub-tertian infections with safety if the patient has taken reasonable care to protect himself against malaria—in other words, if the weight and frequency of infections have been reduced.

When no reasonable prophylaxis has been employed, either through carelessness or ignorance or perhaps through lack of opportunity (as, for example, in a rapidly moving campaign in areas where sub-tertian malaria is prevalent), the ingestion of quinine may prove dangerous in precipitating blackwater fever in patients suffering from sub-tertian malaria. In these circumstances it is considered advisable to replace quinine by an anti-malarial drug of the "Atebrin" type.

References.

[1] J. G. Thomson and A. Robertson: "Protozoology", 1929, page 74.

[2] W. Yorke: "Observations on Hæmoglobin, Reticulocytes, and Blood Sedimentation Rate in Cases of Therapeutic Malaria and the Effects of Treatment of Them", *Journal of Tropical Medicine and Hygiene*, Volume XLII, September 15, 1939, page 277; abstracted in *Tropical Diseases Bulletin*, Volume XXXVII, Number 5, May, 1940, page 361.

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TUBERCULOSIS AND THE WAR.

AT the present time, when great concern is being shown in certain quarters about the health of the people of Australia, the future of preventive medicine in this country and the elimination of such diseases as tuberculosis, it is fitting that attention should be directed to a report recently issued by a committee of the Medical Research Council of Great Britain, the Committee on Tuberculosis in War-Time.[1] This report, which is one of the "Special Report Series", is published as usual with a preface from the Medical Research Council, but it expresses the views of the members of the committee; the Chairman of the committee is Lord Dawson of Penn and the Secretary is Dr. P. D'Arcy Hart. In view of the conditions which are known to favour tuberculosis, the idea that the disease should become more prevalent during a war such as the present is readily understood, for in large centres of population such as are found in some parts of Great Britain, many of these favouring conditions are given almost free play. So far as can be ascertained there is no reason to suppose that the incidence of tuberculosis has increased in Australia as a result of the present war. Even if we grant that no increase has taken place, we should be more than foolish to neglect the study of this recent British report, for the committee that has drawn it up was appointed by the Medical Research Council at the request of the Ministry of Health, with the following terms of reference: "To assist in promoting an investigation of the extent and causes of the war-time increase in the incidence of tuberculosis, particularly among young women, and also to advise the Council regarding possible preventive measures." The Medical Research Council points out that the present report differs from those usually published in the Council's series in that it describes no new researches, but consists rather of a critical review of available evidence, and gives the committee's practical recommendations based on that evidence. The most recent development discussed is mass radiography, but apart from this almost every other aspect mentioned will be found set out in orderly sequence in the admirable paper read by M. J. Holmes at the Adelaide Congress of 1937 and published in this journal on November 6 of that year. The report is perhaps best described as a first-rate propaganda document which should be brought to the notice of those who control public health funds, hospitals and sanatoria, and diagnostic facilities—it shows quite clearly many things that ought to be done and also some that should be avoided.

The mortality from tuberculosis was gradually declining up to the beginning of the war. In England and Wales there were in 1928 38,632 deaths from tuberculosis, and in 1938 there were 26,176 deaths, with corresponding death rates of 91 and 60 per 100,000 persons. In 1938, there were, however, under supervision at the tuberculosis dispensaries of England, Wales and Scotland some 230,000 persons suffering from active or recently active tuberculosis; more than 60,000 new cases and 30,000 deaths were notified in that year. More than half of the new cases and of the deaths occurred in persons under the age of forty-five years; in fact at ages fifteen to twenty-four tuberculosis caused more deaths than any other single disease and about one-half of the total number of deaths due to all diseases. In 1940 the total number of deaths from tuberculosis in England and Wales exceeded those of 1939 by 2,528; both non-respiratory and respiratory forms of the disease were responsible for the increase. In 1941 there was a further rise of 516 in the total number of deaths, the increase being mainly in the non-respiratory form of the disease. In Scotland the total number of deaths in 1940 was 477 more than in 1939; in 1941 there was a further addition of 171 deaths. When 1941 was compared with the average of the immediate pre-war years the increase in respiratory tuberculosis was about 10% for England and Wales and 18% for Scotland; for non-respiratory tuberculosis the increases were about 21% and 28% respectively. The most prominent feature of non-respiratory tuberculosis was the increased incidence of tuberculous meningitis. This increase in England and Wales affected all age-groups up to forty-five; children up to ten years showed a relative increase in mortality of 50%. Compared with 1939 there were, in 1941, among children under ten years of age, 155 more deaths from the respiratory forms of tuberculosis, 471 more from meningitis and 146 more from tuberculosis in other sites. It is pointed out that, taking all forms of tuberculosis into consideration, the available figures show that children, young adults (especially females) and the older male age-groups have suffered most. In comparison with the last war, children are an added group in this war.

Recognizing that an increase in the incidence of tuberculosis has taken place in Great Britain, we ask what factors have been responsible. The committee issuing this report is wisely cautious in its assessment of responsible

[1] "Report of the Committee on Tuberculosis in War-Time", Medical Research Council of the Privy Council, Special Report Series Number 246; 1942. London: His Majesty's Stationery Office. 10" × 6", pp. 36. Price: 9d. net.

factors—we are told that they cannot yet be accurately assessed and the committee hopes that investigations at present in progress will eventually assist in this task. In this hope everyone will concur. We are told and, of course, agree that modern war tends to intensify the various social and environmental factors that are generally considered to affect the level of tuberculosis in a community. The present war broke out in September, 1939, and before the end of 1940 the deaths from tuberculosis in England and Wales had increased by 2,538. With no knowledge of how long it would take for an average tuberculous infection to run its course in England and Wales, we cannot help thinking that the responsible factors acted very quickly and with effect. In this regard it is surprising that the added number of deaths for 1941 was only 516. This is the kind of question with which part of the investigations at present being carried out will probably deal. With this indication for caution in the unquestioned acceptance of figures—an indication which does not detract from the value of the present report, whose authors are obviously cautious—we may enumerate the factors regarded as likely to have been responsible for the increase. First of all certain environmental factors peculiar to the present war are enumerated as follows: (*a*) Many tuberculosis hospitals and sanatoria were evacuated in September, 1939, to make room for expected air-raid casualties, numerous patients being returned to their homes in an infective state. (*b*) The institution of blackout conditions, by diminishing ventilation, increased cross-infection and possibly lowered resistance. (*c*) Homes were overcrowded owing to the destruction of houses by enemy action and to billeting. (*d*) Evacuation of the population may have introduced tuberculous persons into healthy homes and healthy persons into tuberculous homes. (*e*) Town children previously supplied with pasteurized milk possibly had to change over to a raw milk supply. The chief among the features common to the war of 1914-1918 and the present war is industrialization. This means that the number of workers in factories is increased and more persons are exposed to tuberculous infection; tuberculous persons are being drawn into industry; general resistance is lowered by inadequate rest and recreation, by deficient ventilation and improper lighting. The question of food also has to be considered. Here it is necessary to avoid the temptation of jumping to conclusions. The committee points out that the relation of nutrition to the increase of tuberculosis in the present war is difficult to assess. They think that the nutritional needs of children are being met, "for the health of the child population is, generally speaking, up to its peace-time level". On the other hand, in view of certain deficiencies the adult population must be regarded as being inadequately supplied with milk during the winter months. The introduction of "British Restaurants" and factory canteens has helped to maintain the nation's standard of nutrition. "With adults as with schoolchildren, it is the communal mid-day meal which offers the best opportunity of ensuring the inclusion of protective foods."

In regard to the steps that should be taken, the committee, as would be expected, points out that of the factors which decide the fate of a person with pulmonary tuberculosis, great importance must be attached to the extent of the disease at the time that a diagnosis is made. The question of early diagnosis in pulmonary tuberculosis need not be debated in this place, nor need reference be made to the surreptitious way in which the disease makes its attack. The committee, also as would be expected, lays stress on mass radiography as a means by which the disease can be discovered before symptoms develop. It thinks that, subject to limitations of apparatus, the controlled use of radiography before or as soon as possible after employment should be extended especially (*a*) in the Services, (*b*) among men and particularly women entering the war industries, (*c*) among those taking up certain other occupations. It also believes that where practicable a single mass X-ray examination should be carried out on those already employed in certain industries and that, as an extension of this examination, X-ray examinations should be repeated at regular intervals upon certain groups of the population including employees in factories containing large numbers of young adults, nurses and medical students, and merchant seamen. This recommendation will be widely accepted, and in Australia already, as is well known, efforts are being made to use microradiography in the early diagnosis of tuberculosis among members of the general public. This is entirely laudable, but it is likely that in the future experts in preventive medicine will not be content with this, but will demand the complete examination with bacteriological control described and carried out by Reginald Webster, of Melbourne, last year. The other recommendations of the committee include the provision of institutional accommodation, financial provision for sufferers, the examination of contacts, the control of working conditions, the pasteurization of milk, rehabilitation and propaganda. On any one of these a whole treatise could be written without exhaustion of the subject. Since we are concerned immediately with this report in its relation to Australian conditions, brief reference will be made to one or two of them. In the first place the medical profession of the Commonwealth has for years tried to make the authorities realize that if sufferers from tuberculosis are to be persuaded to come under treatment in the early stages of their disease, some financial provision will have to be made for their immediate dependants during the term of their incapacity. So far all efforts have been unavailing. The experiences of the last year or two will for ever make it impossible for any government to claim that money cannot be found for such an important step in preventive medicine. Much the same kind of statement can be made about some Commonwealth-wide organization for the rehabilitation of the tuberculous, which, as the English committee insists, should be looked upon as an essential part in treatment. The final point has to do with institutional treatment. The report has shown that one of the causes for the increase in tuberculosis was the closing down of tuberculosis hospitals and sanatoria. Here is one of the things that we must not do in this country. Certain proposals were in one State happily opposed with success. Whatever else is done, the tuberculous must not be sent among the general population to spread disease. The tuberculous are among those who must on no account be neglected in wartime. To continue efforts to stamp out tuberculosis is one of the ways in which the manpower of the nation can be conserved. Such efforts will pay large dividends in the future. At the same time this report from England shows that the task is not to be taken lightly. In preventive medicine, as in many other avenues of life, the short-cut millennium chasers are certain to be disappointed.

Current Comment.

THE TREATMENT OF ANTHRAX WITH SULPHONAMIDE COMPOUNDS.

ANTHRAX is a disease which, according to Topley and Wilson, has been known from antiquity, though in earlier days it was not clearly separated from other affections closely resembling it. Its incidence is widespread, as it occurs in nearly every country in the world, though there are some areas, such as Beauce, Champagne and Auvergne in France, East Prussia, the plain of the Danube, parts of Siberia and Asia Minor and the great deltas of the Mississippi and Brahmaputra, in which it is especially prevalent. Its history is perhaps as well known to the laity as to the medical profession, for anthrax, owing to its incidence among domestic animals as well as in man, has always been a serious problem in civilized communities. The causal organism, *Bacillus anthracis*, was, on account of its large size, the first bacillus to be described. Most of us are familiar with the story of Pasteur's experiment with heat-modified vaccines, at Mélun, and with the fact that it was Koch's classical description of *Bacillus anthracis* which brought him sudden fame in 1877. Since that date, the chief events in the history of anthrax have been the preparation of anti-anthrax serum from asses by Sclavo, and the use of prophylactic treatment for animals devised by Sobernheim who used serum combined with a modified vaccine.

Few of us, however, in this country at any rate, have seen many cases of anthrax in man; interest is aroused, therefore, by the experience of Herman Gold, who had the opportunity of diagnosing and treating 60 patients with external anthrax in the decade 1933-1943.[1] Fifty-one patients were employees of a local mill engaged in the manufacture of "inner lining"; the basic raw material of this fabric is goat hair imported from China and India. In four cases the patients were children, three of whom lived in the village near the mill. The fourth child contracted the disease after washing her father's work shirt. Three other patients were employees of a Philadelphia plant that obtained its hair bobbins from the local mill. The cases tended to occur in small batches, so to speak, in rapid succession, indicating, according to Gold, that the disease was caused by different shipments of hair. Bacilli were recovered repeatedly from the centre of various bales of hair, as well as from the dust left over in the combing process. Twenty-one patients were treated with anti-anthrax serum. One death occurred. Gold emphasizes the fact that in order to secure recovery, large amounts of serum, varying from 200 to 2,200 cubic centimetres, were administered intravenously. He believes that serum should be administered in quantities sufficient to control the local œdema. In the first case encountered the patient died, and Gold believes that this death was due partly to the timorous use of insufficient quantities of anti-anthrax serum and partly to the local injection of serum around the "pustule". He is firmly of the opinion that the local lesion should be left severely alone. Excision, of course, is forbidden by most authorities on the subject and belongs to the dark ages of anthrax treatment. In this series, neoarsphenamine was found to be of little or no benefit. Chemotherapy with the sulphonamide series of drugs gave excellent results. The author writes:

> In 42 cases of anthrax, treatment was with sulfonamide compounds; with excellent results in 39 cases. In 1 case the patient became worse after intensive treatment with sulfapyridine and its sodium salt, but he recovered after the injection of large doses of antianthrax serum and neoarsphenamine and immunotransfusions. In another case the patient failed to respond to adequate doses of sulfathiazole, but he recovered after the administration of serum. In the remaining case, sulfapyridine therapy was stopped too soon and antianthrax serum was given instead with good results. . . . Because of the high incidence of nausea and vomiting encountered in the course of sulfapyridine therapy, I consider sulfathiazole the drug of choice at the present time. . . . Sulfonamide compounds are a safe and reliable substitute for antianthrax serum. These chemotherapeutic agents are easy to administer; their use materially shortens the period of hospitalization and disability and they are economical.

This is one of the first authoritative papers on the treatment of anthrax with sulphonamides and the results are of great interest. Combined treatment with serum and sulphonamides has been described previously, but, of course, when both forms of treatment are used, no conclusions can be drawn as to their relative values. There may be a certain natural immunity to external anthrax in human beings. We know very little about immunity in relation to anthrax; no one knows how anti-anthrax serum produces its effect. It contains neither bactericidins nor antitoxins. Hitherto pulmonary and intestinal anthrax have been, so far as is known, invariably fatal in the human subject. Perhaps treatment with sulphathiazole might prove useful here; a difficulty, of course, would be presented by the diagnosis of these rapidly fatal forms of the disease.

The question of the prevention of anthrax is a vital one. Gold thinks the problem can and should be managed by the government through the establishment of disinfecting stations at the port of entry. Apparently this is not done in the United States of America. Anthrax in human beings is much rarer in Great Britain since the introduction of compulsory disinfection of Egyptian wool and of all imported goat hair and of horse hair from China and the Union of Socialist Soviet Republics. A large disinfectant plant at Liverpool has proved adequate for this, as far as hair and wool are concerned. It does not entirely settle the problem, however, for there is no satisfactory way of disinfecting raw hides and skins.

[1] *Archives of Internal Medicine*, November, 1942.

A MEMORIAL TO BANTING.

THE ordinary issue of *The Canadian Medical Association Journal* for November, 1942, takes the form of a memorial to the late Sir Frederick Banting; in this respect it is an extraordinary issue. Running through the volume there is evidence of gratitude to and affection for the man and of pride in his achievement. Banting was a many sided man. The gift that he with Best and others gave to the world in insulin cannot be over-estimated. The papers published in this issue show "in some degree the great variety of subjects whose investigation he made possible not only by his own achievements, but by the direct stimulation of his wide-ranging mind". C. H. Best, Banting's partner in the great research, has written "Reminiscences of the Researches which Led to the Discovery of Insulin". J. B. Collips writes "Recollections of Sir Frederick Banting". C. C. Lucas writes on the chemical nature of "royal jelly" whose nature, he tells us, had for years interested and tantalized Banting; Mavis Gunther writes on lactation in women; and Kenneth C. Fisher writes on narcosis, his work having been "substantially assisted by grants from The Banting Foundation, Toronto". Allan G. Gornall, who also received a grant from the same source, reports a nitrogen study in the ornithine cycle of urea formation. Martin M. Hoffman, of Montreal, reports studies in the metabolism of progesterone. Best in his recollections refers to Banting's modesty which was apparent from the start of their investigations. The association must have been a happy one. Together Banting and Best translated the work of Hédon and other French workers and the information secured provided a basis for their first attempts to produce the diabetic state upon which they wished to study the effect of their pancreatic extract. Eventually Banting developed a one-stage operation for complete pancreatectomy. Best also describes some of the difficulties experienced with the blood sugar estimations. He publishes facsimile reproductions of pages from two of their note books. Banting had an affection for the animals with which he worked; apparently they became attached to him, for Best records that most of the animals were trained to put out a paw and hold it steady while samples of blood were removed from the veins. And during the whole of the summer of 1921 neither Banting nor Best received a salary, but lived on funds partly derived from the sale of Banting's motor car!

Abstracts from Medical Literature.

PHYSIOLOGY.

The Effect of Histamine Phosphate on Capillary Permeability and Inflammation.

R. H. RIGDON (*The Journal of Laboratory and Clinical Medicine*, September, 1942) discusses the effect of histamine phosphate when injected intradermally into a number of rabbits. A change was produced in the tissue cells which permits the localization and concentration of trypan blue in the area. This localization and concentration of trypan blue are influenced by both the concentration of histamine and the intravenous injection of the dye. Polymorphonuclear leucocytes become localized in the subcutaneous tissues of the rabbit following an intradermal injection of histamine phosphate. Necrosis also occurs in the fibres of the cutaneous maximus muscle following the injection. The number of white blood cells increases in the circulating blood following an intravenous injection of histamine phosphate. The number, however, returns to normal within a period of twenty-four hours.

Influence of Components of the Vitamin B Complex on Recovery from Fatigue.

E. E. FOLTZ, A. C. IVY AND C. J. BARBORKA (*The Journal of Laboratory and Clinical Medicine*, August, 1942) describe some experiments made on fatigued subjects by injecting thiamin, cocarboxylase, riboflavin and "parenteral vitamin *B* complex" intravenously. The "double work period" was used. The subjects rode a bicycle ergometer at a fixed rate and speed until they failed to maintain this rate. The injection was then made. After ten minutes' rest they rode again until the rate could not be maintained. The authors quote results supporting their contention that the percentage recovery after exercise is a fairly constant physiological characteristic of the amount of fatigue. Thiamin, cocarboxylase, riboflavin and "parenteral vitamin *B* complex" when given intravenously had no immediate influence on recovery from voluntary muscular fatigue in subjects receiving adequate nutrition.

Respiratory Effects upon the Visual Threshold.

G. WALD, P. V. HARPER, H. C. GOODMAN AND H. P. KRIEGER (*The Journal of General Physiology*, July, 1942) describe the effects upon the threshold of human subjects of low oxygen tensions, applied gradually or suddenly, and of short or long duration. Also the effect of changes in the rate of breathing was examined. Measurements are reported of the effects of respiratory stresses upon the absolute threshold of peripheral (rod) vision. Since subjects were kept wholly dark adapted and the photochemical system of the rods therefore stationary, the changes recorded may be assumed to have originated more centrally. To this degree the measurements provide a quantitative index of nervous imbalance. Breathing room air or 32% to 36% oxygen at about double the normal rate causes the visual threshold to fall to approximately half the normal value within five to ten minutes. This change is due primarily to alkalosis induced by the hyperventilation and can be abolished or reversed by the addition of carbon dioxide to the inspired mixtures. Normal or rapid breathing of 2% carbon dioxide causes no change in threshold; with 5% carbon dioxide the threshold is approximately doubled. Breathing 10% oxygen at the normal rate also approximately doubles the threshold. This effect is compensated in part by rapid breathing. When 10% oxygen is breathed at twice the normal rate the threshold usually falls at first, then slowly rises to supernormal levels. Owing primarily to variations in their breathing patterns, subjects yield characteristically different responses on sudden exposure to low oxygen tensions with breathing uncontrolled. The threshold may either rise or fall; and on release from anoxia it may rise or fall to normal or subnormal levels. The threshold becomes adjusted to anoxia rapidly; exposures lasting five to six hours do not produce greater or more persistent changes than those of much shorter duration.

The Determination of Blood Volume in Man.

L. J. DAVIS (*Edinburgh Medical Journal*, August, 1942) reviews the various methods for the determination of blood volume, and discusses the various factors which influence the results obtained with the dye method. Details are given of a simple dye method of blood volume estimation depending upon the direct estimation of the blue dye T-1824 (Evans blue) in a single sample of serum by means of the "Spekker" absorptiometer. The results of blood volume determinations on eleven normal individuals and a small group of patients suffering from obesity, anæmia and polycythæmia are recorded.

BIOLOGICAL CHEMISTRY.

Absorption of Iron.

W. BALFOUR, P. HAHN *et alii* (*The Journal of Experimental Medicine*, July, 1942) have used radio iron to study absorption of iron in human beings. They suggest that when the iron stores are depleted the human being will absorb iron in relative abundance—in fact from ten to twenty times the normal amount. Although the iron stores of the body are mainly in the liver, spleen and bone marrow, these stores influence iron absorption in some obscure fashion. Anæmia does not control iron absorption. This control is exerted upon the gastro-intestinal mucosa which can refuse or accept iron under various conditions. Normal human pregnancy without significant anæmia may show active radio iron absorption—16% to 27% of iron intake. The pregnant woman as a rule absorbs from two to ten times the normal amount of iron. Diseased states in which iron stores are known to be very abundant—pernicious anæmia, hæmochromatosis, familial icterus and Mediterranean anæmia—are characterized by very little absorption, probably less than normal. This is in spite of a severe anæmia in all conditions except hæmochromatosis. Chronic infections in spite of anæmia show no utilization of radio iron, whether it may be absorbed or not. In leuchæmia there is little utilization of radio iron in red cells in spite of absorption (autopsy), probably because of white cells choking the red marrow.

Tissue Thiamin.

J. FERREBEE, N. WEISSMAN, D. PORKER AND P. OWEN (*Journal of Clinical Investigation*, July, 1942) report on tissue thiamin concentrations and urinary thiamin excretion. The concentrations of thiamin in human tissue are of the order of 2·0 to 3·0 microgrammes per gramme for heart muscle, 0·5 microgramme per gramme for skeletal muscle and 1·0 microgramme per gramme for brain, liver and kidney. These concentrations may be temporarily increased by thiamin therapy or they may be considerably reduced by inadequate diets. In comparable circumstances, deficient subjects tend to excrete less thiamin than normal subjects. This tendency is not sufficient to permit recognition of small changes in tissue thiamin concentrations by measurements of thiamin excretion.

Amino Acids in Diabetes.

J. LUETSCHER (*Journal of Clinical Investigation*, May, 1942) has investigated the metabolism of amino acids in *diabetes mellitus*. Twelve patients with severe untreated *diabetes mellitus* had high fasting plasma amino acid levels. The high plasma levels were accompanied by increased urinary excretion of amino acids, and could not be correlated with urea retention. The administration of insulin caused a rapid return of blood levels to normal. On continued insulin therapy, the plasma amino acid was maintained at normal levels, despite the fluctuation of the blood sugar. Evidence suggests that in severe untreated *diabetes mellitus* there is an increase in the rate of production or liberation of amino acids, and that the administration of insulin is followed by the return to a more normal rate.

Radio-Active Di-Azo Dyes.

F. MOORE AND L. TOBIN (*Journal of Clinical Investigation*, July, 1942) have investigated the localization of radio-active di-brom trypan blue in inflammatory lesions and normal tissue. This radio-active colloidal dye becomes concentrated in inflammatory lesions to an extent detectable from outside the intact animal with a suitable counter. By means of this radio-active dye, lesions in the periphery of the body were detectable in all cases, whereas abdominal lesions were detectable in 77% of instances.

Fat Deposition.

G. WEBSTER (*Journal of Clinical Investigation*, July, 1942) has given a description of necrosis and cirrhosis of the liver, and of renal necrosis, fibrosis and hæmorrhage among rats receiving diets poor in protein and choline and rich in fat content. The hepatic lesions were prevented by an increase in the protein content of the diet and by the addition of molasses. A reduc-

tion in the fat content diminished the severity of the lesions, as did the addition of betaine. Cystine and cholesterol increased the severity of the fibrotic changes. The effect of cystine was ameliorated by betaine. Thiamin and riboflavin were without influence on the disease. Yeast prevented the lesions, but its efficacy could be due to the extra protein and choline which it contributed. The renal lesions, like those of the liver, were prevented by brewer's yeast and molasses. Increased protein intake materially reduced the severity of the lesions, and thiamin and riboflavin again were without effect. A reduced proportion of fat in the diet and the addition of betaine to the basal diet decreased the severity of the lesions. Cystine alone had no effect on the lesions, although rats receiving cystine *plus* betaine showed no detectable kidney disease. Cholesterol exaggerated the lesions to a marked degree. Neoplasms occurring in 20% of the rats receiving added cystine are described.

Hyperbilirubinæmia.

A. CANTAROW AND C. W. WIRTS (*The Journal of Laboratory and Clinical Medicine*, October, 1942) report on the occurrence of hyperbilirubinæmia and other evidence of hepatic functional impairment during or after administration of sulphonamide compounds to twenty patients. The data indicate that hyperbilirubinæmia and other hepatocellular damage may occur during the course of administration of sulphadiazine, sulphathiazole, sulphapyridine and sulphanilamide. Routine determinations of serum bilirubin concentration and tests of hepatic function would probably reveal a much higher incidence of hepatic functional impairment than has been reported heretofore following the use of these agents.

Hæmopoiesis and Lead Poisoning.

J. KENCH, A. GILLAM AND R. LANE (*Biochemical Journal*, April, 1942) have studied the blood and urinary porphyrins in lead workers in order to ascertain how lead affects hæmopoiesis. They conclude that the physiological action of small amounts of lead cannot be explained in terms of partial prevention of iron porphyrin complex formation. The occurrence of protoporphyrin and non-hæmoglobin iron to the extent observed in these and other experiments appears to be incidental to restricted cellular activity. Diminution of hæmoglobin in lead poisoning is a consequence, not of non-utilization of protophorphyrin, but of restricted formation of this vital pigment.

Guanidine and Muscular Dystrophy.

R. P. MACFATE (*The Journal of Laboratory and Clinical Medicine*, October, 1942) has investigated the relationship of guanidine to muscular dystrophy. The abnormal metabolism of creatine (methylguanidine acetic acid) in progressive muscular dystrophy and certain other muscular conditions has been reported previously. The daily administration of one-third to four-fifths of a minimal lethal dose of a toxic guanidine salt, over a period of several weeks, produces changes in the metabolism and structure of the muscle, similar to those found in nutritional muscular dystrophy and in progressive muscular dystrophy. There are produced a loss of creatine and phosphate from the muscle and severe disturbances in carbohydrate metabolism and the electrolyte balance. It is suggested that guanidine may lower the permeability of the muscle cell, producing these changes. One milligramme of glycine per gramme of body weight, administered daily, appears to afford some protection against small daily doses (one-third to four-fifths of a minimal lethal dose) of a toxic guanidine salt. Glycine delays the progress of a nutritional muscular dystrophy. It is suggested that the abnormal metabolism of guanidine compounds may be an ætiological factor in the prpoduction of a progressive muscular dystrophy.

MEDICINE.

Purpura Due to Vitamin K Deficiency.

P. M. AGGELER, SAINT LUCIA AND H. M. FISHBON (*The American Journal of Digestive Diseases*, July, 1942) report a case of purpura due to vitamin *K* deficiency in *anorexia nervosa*, in which the abnormal bleeding state was cured by the administration of vitamin *K*. The patient was a woman of thirty-two years and presented the complaints of anorexia, vomiting, diarrhœa, gingival bleeding and ecchymoses. She had subsisted on a deficient diet for many years. Five years previously she had suffered for two months from a severe attack of anorexia when she vomited all ingested food and had diarrhœa, and one month after the onset of these symptoms, ecchymoses appeared over the entire body and persisted till the gastro-intestinal symptoms had abated after readjustment of her emotional difficulties. Two years previously she had suffered from a similar attack accompanied by hæmorrhage from a tooth socket and bleeding into the elbow joints, which was controlled by a blood transfusion, but the purpura continued despite repeated intravenous injection of large doses of cevitamic acid. When examined by the authors, she had had severe anorexia, vomiting and diarrhœa for three weeks, ecchymoses had been present for five days and gingival bleeding for one day. She had taken one pint of fresh orange juice daily for four days. She was an agitated, poorly nourished woman, manifesting many ecchymoses scattered over the trunk and extremities, and the gingival margins were spongy and bleeding. There were no other abnormal signs on physical examination, except that the deep reflexes were hyperative. Laboratory examinations revealed severe hypoprothrombinæmia and a prolonged coagulation time of the blood. The bleeding time, platelet count and capillary fragility were normal, and the clot retraction was only slightly impaired. The patient was given five milligrammes of synthetic vitamin *K* intravenously, followed two days later by daily oral administration of three to six milligrammes. The gingival bleeding ceased immediately, and the prothrombin concentration and coagulation returned to normal. Within one week, all ecchymoses had disappeared and the patient improved remarkably from a psychological point of view with cessation of the vomiting and diarrhœa; she resumed a reasonably normal diet. The authors state that there is a two-fold mechanism for the production of vitamin deficiencies in patients suffering from *anorexia nervosa*, one, the exogenous dietary deficiency, the other, hypermotility of the gastro-intestinal tract resulting in defective absorption. They point out that their patient did not have scurvy since the capillary fragility was normal despite the fact that the plasma cevitamic acid level was low, and also the tendency to bleed was not controlled by the administration of large quantities of fresh orange juice or the intravenous injection of large doses of cevitamic acid. They are of the opinion that the purpura was due to a severe degree of hypoprothrombinæmia and was cured by the administration of vitamin *K*.

Deaths During Sulphathiazole Therapy.

MAX LEDERER AND PHILIP ROSENBLATT (*The Journal of the American Medical Association*, May 2, 1942) discuss four deaths which occurred during sulphathiazole therapy, and which were associated with anuria and urolithiasis. They conclude that the indiscriminate and uncontrolled use of sulphathiazole is not without danger, and that the urine should be frequently examined for crystals or hæmaturia. An adequate fluid intake and output should be maintained during treatment, and a chill occurring during the administration of sulphathiazole and followed by sustained fever should be regarded as a danger signal and sulphathiazole therapy should be discontinued at once. Diminution and suppression of urinary output should be considered a contra-indication to further administration of the drug. A blood concentration of sulphathiazole over 10 milligrammes per 100 cubic centimetres is undesirable unless the above-mentioned precautions are observed. Finally, sulphathiazole should be used only when definitely indicated and its administration should not be continued longer than is absolutely necessary.

Gastric Ulcer in a Child.

M. KRAEMER (*The American Journal of Digestive Diseases*, October, 1942) describes chronic gastric ulcer in a six year old child. The condition is extremely rare. Only 25 cases have been reported in the literature in children between the ages of two and eleven years; only seven cases have been reported in children between the ages of two and six years. In the case recorded now, the child complained of pain in the left upper quadrant of the abdomen which lasted for four or five minutes at a time. This pain rarely came more than once a day, usually before or during breakfast. It disappeared for weeks at a time, but during the week January 8 to 15 pain was present every day. The child vomited once only in the course of his illness. The appetite was good, there were no other symptoms and no physical signs. With the patient standing after a teaspoonful of barium was swallowed, a niche could be seen on the posterior gastric wall in the body of the stomach. After five days on ulcer regimen the pains ceased, and on February 16 no niche could be demonstrated.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on November 26, 1942, at the Robert H. Todd Assembly Hall, British Medical Association House, 135, Macquarie Street, Sydney, DR. W. F. SIMMONS, the President, in the chair.

Foreign Bodies and War Wounds.

COLONEL R. V. GRAHAM read a paper entitled "Foreign Bodies in Relation to War Wounds" (see page 117).

MAJOR E. W. FRECKER read a paper entitled "The X-Ray Localization of Foreign Bodies" (see page 113).

DR. C. C. MCKELLAR thanked those responsible for the organizing of the meeting, as well as the two speakers. He referred to the question of sutures acting as foreign bodies, and asked whether Colonel Graham made any exception to his condemnation of the procedure in the case of shattered limbs. Dr. McKellar referred to a lad under his care who had his elbow out of his motor car when it was struck by a lorry and had sustained an extensive compound wound laying the arm open from the middle of the humerus to the middle of the forearm. The humeral shaft was comminuted, the two condyles and the top of the olecranon were like so many scattered marbles and a good view was had of several inches of the brachial vessels and the ulnar median and dorsal interosseous nerves; all were intact. The olecranon fragment was excised, but the condyles were lashed to one another and to the humeral shaft; also the ulnar shaft was drilled and lashed with stainless steel wire. The wound in the triceps which was through to the bone and of the back of the forearm which was through all the superficial layer were left untouched apart from removal of hopelessly damaged tissue. Amputation had been expected by the hospital staff and without the lashing it was hardly an arm at all. Dr. McKellar asked Colonel Graham whether he had done the right thing in that special case.

Referring to radiological appearances, Dr. McKellar said he had found that recent blood in the tissues could simulate gas gangrene (as in two cases of bruising on the inside of the arm); he could not distinguish between the conditions at all on the radiological appearances. He asked Major Frecker to comment on that point. Finally, Dr. McKellar asked Dr. Frecker to repeat the formula for skin ink that had been mentioned in the course of his paper.

LIEUTENANT-COLONEL V. M. COPPLESON referred to the localization of foreign bodies from the point of view of the radiographer and the surgeon. In the Middle East they had seen a number of methods in use; one method was by means of sighting, very similar to that of a rifle sight. Another method was by means of concentric circles. Colonel Coppleson said that he much preferred localization by means of stereoscopy, and Major Frecker and he had worked out quite a number of problems in that way. Colonel Coppleson thought that after X-ray pictures had been taken, if a scar was present it should be covered with a piece of strapping the exact shape of the scar. Stereoscopic skiagrams were then taken, and if the surgeon had them in front of him in the operating theatre, it was usually quite easy to find the site of the foreign body. When no scar was present, then a spot was chosen and marked that seemed the best approach on the skin; this was covered with strapping and then stereoscopic skiagrams were taken. Colonel Coppleson said that the radioprobe had not been mentioned and that it had been used at Pearl Harbour. The radioprobe worked on the principle that an audible frequency was altered when the probe was brought within two inches of a foreign body. Colonel Coppleson understood that some work along those lines was being done in New South Wales, but as yet no actual instrument had been seen in Australia.

DR. A. T. NISBET said that the late results in cases of foreign bodies in wounds were interesting, when seen many years after the last war. Localization of the foreign bodies became necessary; indeed, the necessity was of almost daily occurrence. The foreign body might be a piece of bone forming a sequestrum; it might lie in the soft or hard tissues. Sometimes it was found that the foreign body was causing trouble; there might be almost a rarefied area around it, like a sequestrum in bone when it was surrounded by pus. With regard to Lieutenant-Colonel Coppleson's remarks, Dr. Nisbet said that once upon a time there was a telephone probe; he had used it time and again. Colonel Gordon, at the Royal Melbourne Hospital, had been very interested in it. Dr. Nisbet used to be "dragged along" to hear the telephone ring; but he never heard it ring. He thought that at the present time they had better geometrical knowledge and did not leave everything to radio. Dr. Nisbet then referred to the types of foreign bodies encountered. He said that the Prince of Wales Hospital was a base hospital for the Navy, and it had been receiving patients from recent actions in the Pacific. The foreign bodies were extremely different from those previously found; pieces of deck were found in lungs, in buttocks, in fact all over the body. Depth localization of one foreign body should be so easy at the present time that it should not be necessary to worry radiologists and technicians to do it; the depth could be measured off on a scale.

Colonel Coppleson spoke again to refer to an unusual problem in regard to foreign bodies that he had seen in Greece at a British hospital. The patient was an officer who had a bullet in the side of his chest, localized by the radiographer to the eighth or ninth intercostal space. Colonel Coppleson had been present when Colonel Donald operated on that side. An exhaustive search was made, but the bullet could not be found. Further skiagrams were taken, and the bullet appeared in a different position. Colonel Coppleson left the hospital at that stage. When he returned he inquired about the patient. He had been told that a further operation had been performed, and the bullet had been found free in the pleural cavity. It had been moving about in the pleural cavity as the patient changed his position.

DR. B. T. EDYE thanked the two speakers for the able manner in which they had presented the subject. His mind had been taken back to the last war; he had had little experience of foreign bodies since then. He well remembered the search they used to make for shell fragments *et cetera* and the amount of damage that must have resulted before they thoroughly understood the septic aspect of the question and the difficulties in localization. At that time there was attached to the hospital the late Dr. Herschel Harris who had established at St. Nazaire the first X-ray plant used in connexion with the British Army. Later when the Army moved forward he set up a plant at Wimmereux and did likewise at Lemnos when transferred to an Australian hospital at that island. As the war progressed methods improved and the stage was reached at which treatment in the present war began. Surgical treatment was undertaken nearer the front line, in the casualty clearing stations, where, however, there were no X-ray plants. Wounds were treated by the improved technique and many foreign bodies were located and removed; sepsis was thereby controlled and many wounds healed by first intention. One point, not stressed by Colonel Graham, was the great advantage of taking skiagraphs and searching for foreign bodies with the part in the position occupied when injured, if this fact was ascertainable. To give an illustration Dr. Edye mentioned an instance in which a few years earlier he was asked to remove a broken lumbar puncture needle. The patient was placed on one side and an incision made at the site of puncture, but the needle could not be located. The patient was then turned to his opposite side; this manœuvre caused the skin incision to move to the opposite side of the spinous processes and at once exposed the needle. Dr. Edye thought that too much stress was laid on the removal of foreign bodies. Even in civil practice he could remember instances of bullet wounds in which the missiles were never removed, and from which the patients suffered no harm. With reference to Major Frecker's remarks about the strange courses taken by bullets and other missiles, Dr. Edye called to mind a man during the last war who was brought down from the front line suffering from a hæmothorax. The man had been marching with others when he felt a shock and fell down. It was thought that he had simply collapsed, but on examination there were signs of fluid in the right pleural cavity and a swelling in the right loin. The fluid proved to be due to a hæmothorax and the swelling in the loin to a bullet lying under the skin. A careful search showed that the bullet had perforated the lobe of the right ear, and then entered the neck. These wounds were very small and had healed quickly and for some time were overlooked. It was intriguing, especially in wounds of the trunk, to endeavour to visualize the organs likely to be damaged. With the assistance of a cross-section atlas the track of the foreign body could be mapped. The findings were often very surprising and frequently organs which were thought to be

well away from the line of the track were injured. Dr. Edye wondered whether the cross-section atlas was in use in the present war.

In conclusion, Dr. Edye expressed regret at the small size of the audience and especially at the notable absence of younger members.

LIEUTENANT-COLONEL A. C. THOMAS said that he had worked with Major Frecker at rescuing foreign bodies from soldiers with a certain amount of success. He thanked Major Frecker for the cooperation given by his department in locating these foreign bodies. Like Dr. Edye, Colonel Thomas frankly admitted that he had on many occasions asked himself the question: "Why am I removing these foreign bodies?" Colonel Thomas asked Colonel Graham to give again the indications for the removal of foreign bodies. The men were mostly referred from medical boards. One man had been sniped on Crete, and fell over a ten-foot embankment. He was shot through the buttock, and the wound appeared to be of the through-and-through type. After the fall he was invalided home on account of severe pain in the back. It was found that he had had at one time a Neisserian infection. At the special hospital for venereal diseases he was found to have a much enlarged prostate gland. After he had been for some months treated by prostatic massage, Colonel Thomas was asked to examine him *per rectum*. He did so, and found that in the left lobe of the prostate a hard mass was present. He suggested that a skiagram be taken, and a large German bullet was found embedded in the prostate gland. Colonel Thomas could not see that the bullet was giving the patient any trouble; he told the medical officer so and told the man so, but everyone persisted, and in the end the patient was admitted to hospital and the bullet was removed. At the time of the meeting the man was quite well; but Colonel Thomas thought that he was still going to have pain in the back. Colonel Thomas remembered another man who had a bullet embedded apparently in the region of the sacro-iliac joint; this man also had pain in the back. He was being treated by various departments in hospital; an X-ray examination was made and a bullet was found which he had had for many years. Colonel Thomas was asked to remove the bullet. Thanks to the X-ray department he was able to localize the bullet, which was embedded right in the crest of the ilium. He had to chisel away a shelf of ilium to remove the bullet. Colonel Thomas could not see, again, that the bullet was causing the man any pain. On the other hand, Colonel Thomas had recently had a patient referred from the orthopædic department, a man who had a recurring sinus from his tibia. A bullet and many fragments, amongst them two big pieces, could be seen. In that case, Colonel Thomas thought that they were justified in removing a shell casing and a bullet casing. That was the problem that presented itself to him—whether many foreign bodies should be removed at all. The patients wanted them removed, and many times the medical officer in charge urged the surgeon to remove them against his better judgement. Colonel Thomas asked Colonel Graham for the real indications for removal; he thought that they were very limited unless the foreign bodies were causing trouble.

Colonel Graham, in reply to Dr. McKellar's question about the use of sutures, said that he wished to emphasize the fact that his remarks applied to foreign bodies in relation to war wounds. He reaffirmed his statement that sutures should not be used. About three years previously he had been an ardent advocate of early primary suture of wounds in civilians. His attitude had changed completely regarding war wounds, and it was supported by the attitude of everybody having experience of that work. It became so urgent a necessity to omit sutures from wounds that it was made the subject of army orders. Colonel Graham referred again to the work of a Free French field ambulance that he had mentioned in his paper. The unit was extremely mobile, operating no more than two or three hours' journey from the front line, and the commanding officer insisted on extremely wide opening of all wounds and on leaving them open; he allowed no sutures to be used, and his results were excellent. Colonel Graham insisted that good team work between radiologist and surgeon was much more important to the efficiency of a unit than complicated methods of localization of foreign bodies. Colonel Graham agreed with Colonel Coppleson about the value of stereoscopic methods. Colonel Graham said that he had not mentioned the radioprobe, because his remarks were meant to have a practical application, and because in such work abroad they did not have a radioprobe. They had had to be content with very simple apparatus and surroundings, and their outlook was dictated by lack of apparatus rather than by elaborateness of apparatus. Colonel Graham went on to thank Dr. Edye for his reference to an important point, which should never be omitted from the investigation of these cases and which actually never was omitted; the point was the position of the part when the injury occurred. That position had to be used if one was to have any idea of where the foreign body was. Colonel Graham agreed with Dr. Edye that a section atlas was an exceedingly valuable part of their armamentarium. They had always seen to it that there was at least one anatomical atlas in the hospital. Colonel Thomas had asked for definite indications for the removal of foreign bodies. Colonel Graham said that up to that point he had maintained the attitude that it was difficult to lay down definite indications for the removal of foreign bodies, because individual conditions varied so much in individual cases, and the aptitude of the individual surgeon had to be considered. The indications depended on the experience of the surgeon handling the case. The first indication was recurrent or persistent sepsis, whatever the tissue might be. Colonel Graham urged the necessity of remembering that foreign bodies might be embedded in the tissues, in spite of the fact that the patient appeared to have a superficial wound and nothing else. A search should be made for foreign bodies in any war wounds without any obvious wound of exit. The second indication for removal was the presence of a jagged or rough foreign body in close proximity to a large vessel. A foreign body in the lung might or might not require removal; Colonel Graham would prefer to leave it alone, unless it was causing pneumonitis or some other complication; but if a foreign body was in the pleural cavity, he would remove it. A foreign body embedded in bone and not causing symptoms should be left alone; a foreign body loose in a joint should be removed. A foreign body in the brain, if superficial, should be removed; if it was deeply placed, it should be removed only if the removal would do no more damage. Large, rough fragments of high explosives embedded in muscles caused sufficient pain and disability to alter the outlook of the patient.

Major Frecker, in reply, said that he had not much more to add. He regretted that his address had been so geometrical in nature, but the geometry was necessarily the heart of the procedure.

In reply to Dr. McKellar, Major Frecker said that the formula for the skin ink would be found in the United States Army X-Ray Manual. A good substitute, easily available, was an ordinary indelible pencil dipped in methylated spirit. In answer to Dr. McKellar's question about appearances simulating gas gangrene, Major Frecker said that air was often mechanically introduced into the tissues, and looked like gas gangrene at first sight.

In reply to Colonel Coppleson, who had referred to the "rifle sight" method of localization of foreign bodies, Major Frecker said that he thought it rather inaccurate. The use of concentric circles on the fluorescent screen was merely one method of measuring image shift of the foreign body. Major Frecker said that his experience had not impressed him with the value of depth localization alone as the anatomical knowledge so given was poor. Surgeons had rather rarely requested the classical depth localization of foreign bodies with skin marks probably for this reason.

Dr. Edye had referred to the position of the part when the foreign body entered it; Major Frecker said that the radiologist knew that the ideal localization should be with the limb in the position it would assume when the surgeon was operating on it. He had learnt two lessons at the meeting; one was the necessity for collaboration between the surgeon and the radiologist (the surgeon was the chief actor in the drama, the radiologist was there only to provide assistance), the second was that the question of X-ray localization had been over-emphasized, over-elaborated and made more complex than it really was.

DR. W. F. SIMMONS, from the chair, thanked the two speakers and those who had taken part in the discussion. He said that he had had an apology for inability to be present from Dr. George Bell, and he felt sure that Dr. Bell would regret having missed the meeting. Dr. Simmons and Dr. Bell had been together at the last war, and the remarks concerning early treatment of the wounds under discussion were of particular interest. Their unit had always been close to the front line, and only rarely received casualties more than two or three hours after they had been wounded. It was interesting to note that after an interval of twenty-five years the routine treatment then followed had been the most successful in the present campaign in the Middle East.

Public Health.

PARLIAMENTARY JOINT COMMITTEE ON SOCIAL SECURITY.

THE Parliamentary Joint Committee on Social Security was appointed "to inquire into and from time to time report upon ways and means of improving social and living conditions of the people of Australia and of rectifying anomalies in existing legislation". The personnel of the committee is as follows: Mr. H. C. Barnard (Chairman), Senator Cooper (Deputy Chairman), Senator Arnold, Mr. Maurice Blackburn, Colonel R. S. Ryan and the Honourable J. A. Perkins.

The evidence given before the committee in Melbourne has been summarized and published in previous issues. In the present issue we publish evidence given at Sydney by Dr. John Hughes, Director of the Tuberculosis Division of the Department of Public Health, New South Wales.

DR. JOHN HUGHES, on being sworn, said that he would make a statement concerning what was done at the present time and what he foresaw would be done in future with regard to the control of tuberculosis. At the present time the campaign was concentrated on the idea of examining the populace radiologically, but in New South Wales particular attention was paid to the descendants or relatives of tuberculous patients. The whole disease had a genealogical basis. If, for example, a youth, aged about eighteen years, was discovered to be tuberculous, previously all the contacts in his boarding house would have been radiologically examined; at the present time all the members of his family were so examined. It was impressed on the brothers and sisters (or on the patient's descendants if he had any) that a very dangerous age lay ahead of them (the years from fifteen to twenty-five), and that they should submit themselves to X-ray examination between those years. Dr. Hughes said that it was hoped to find patients with early tuberculosis in that way and to be able to tell the public that early tuberculosis was curable. The chief difficulty was that when such patients were discovered it was difficult to place them. New South Wales was many beds short of the required number. During the campaign against tuberculosis the patient was also being told that he needed to take more sanatorium treatment than had been taken in the past. In New South Wales patients used to spend four to six months in a sanatorium; at present they were told that they should spend no less than twelve months there. In that way beds became "blocked", and although the public was being educated, there were no facilities for the reception of such patients. One of the chief expenses had been the cost of the radiological examination. At the outbreak of war the cost had been reduced by the use of the 35-millimetre film. In the examination of recruits for the Australian Imperial Force, all recruits underwent radiological examination and were submitted to further tests. As soon as the suspicion of tuberculosis was formed, they were referred to the Tuberculosis Division of the Department of Public Health. That was the best piece of anti-tuberculosis work that had been done in Australia. However, within the preceding two months the military authorities seemed to have changed their plans; now they were not referring to the tuberculosis division cases diagnosed on X-ray examination. Dr. Hughes explained that in New South Wales a medical practitioner was not forced to notify a case of tuberculosis unless the patient reacted to the Mantoux test and was found to have tubercle bacilli in his sputum. In all other countries in the world, the diagnosis was made on the X-ray appearances alone, without the presence of tubercle bacilli in the sputum. In that way they discovered early and curable lesions. Dr. Hughes felt that the military authorities were returning to the Dark Ages. If they waited in every case for the diagnosis to be made on the presence of tubercle bacilli in the sputum, they would discover only those lesions that were already in the middle or late stages. Dr. Hughes again stressed the importance of concentrating on the family, and especially on youth. He said that good results had been obtained since the outbreak of war with the young manhood. There had been a change in what happened to tuberculous people; the difficulty previously had been to get them back into circulation after they had been in a sanatorium, because they would really need light work. Before the war so many men were available that sanatorium patients were unable to obtain work. During the war, however, it was much easier to find occupations for them. Dr. Hughes said that the tuberculous patient should be regarded as a partial worker and be able to obtain a light job. At present there was a tendency to obtain rehabilitation through the village settlement. In Australia so far there had been no such thing. The war meant that the tuberculosis patient would rehabilitate himself if some consideration could be shown to him. There was a difference between the attitude adopted by the New South Wales authorities and that of the other States; in New South Wales the authorities concentrated on the direct contacts of patients—his brothers and sisters. Dr. Hughes had pointed out during the last couple of years that facilities for X-ray examination in New South Wales had been made available only at public hospitals and clinics and only during the day time. Dr. Hughes had pointed out most forcibly that there should be facilities for X-ray examination by night, either attached to clinics or privately. One such clinic had been established at Manly; but the brownout had put an end to that. Through the cooperation of radiologists clinics had been established in Macquarie Street where workers could go for examination between the hours of 4.30 and 6.30 p.m. and have an X-ray examination for 10s. 6d. per person. Many patients had availed themselves of these clinics. Dr. Hughes stressed the need for facilities for these examinations after working hours. In New South Wales much propaganda was done by means of posters, the radio, talks, meetings and so on; other States did not seem to concentrate on publicity to the same extent. Dr. Hughes pointed out that in New South Wales no attention was paid to rural tuberculosis; no country town had been systematically surveyed, but rural tuberculosis did exist. In any future campaign the country person in a country town should be educated, and a definite effort should be made to discover the presence of tuberculosis in country districts, or its absence from them. There was no country clinic except one at Broken Hill, which had been in operation for the last twelve or eighteen months. There were clinics at Sydney, Newcastle and Broken Hill. Dr. Hughes said that an ideal scheme would be to have almost an X-ray census of the population. By that means it would be possible to tell who was tuberculous, who was not tuberculous, whose descendants would need care, and so on. Sometimes the discovery of a healed tuberculous lesion in a middle-aged man was a guide to the care of his descendants. Quite apart from the ideal he had mentioned, Dr. Hughes thought that Australia as a community should advocate the surveying of youth at stated times—for example, at the ages of 15, 20 and 25 years. Dr. Hughes then referred to the importance of refugees and evacuees. He said that the authorities had been impressed with the fact that although these people produced medical certificates of good health, they had not known that they were tuberculous before they left their native country. If they arrived with families, they brought a burden of debt to Australia. Dr. Hughes emphasized again the great shortage of beds; he said that in New South Wales 600 beds were needed at once as a minimum. Two beds were needed for every death from tuberculosis in the year. The modern tendency was to avoid allowing people with active tuberculosis to walk around; they were put in hospital. Beds should be available in a city centre; sanatoria in the country could be regarded as for after-care. Dr. Hughes said that New South Wales differed from the other States, particularly South Australia, in not having preventoria. Preventoria took in children of tuberculous parents at the ages of seven, eight, nine or ten years, and let them rest for a period. Dr. Hughes was not impressed with the idea of rest for children of those ages. He said that an outstanding example was the great preventorium in America which had been closed at the outbreak of war. Tests were made with controls, and it was found that the incidence of tuberculosis some years later amongst children who had spent a period in the preventorium was just as high as amongst the controls. Available money could be much better used on young people at the ages he had mentioned before than on children.

The Chairman then referred to reports of the National Health and Medical Research Council for 1937 (Tasmania) and 1939. Dr. Hughes said that he would prefer to be questioned on his opinions rather than to make statements.

In reply to a question by Senator Cooper, Dr. Hughes said that there was evidence that when an early diagnosis was made tuberculosis could be cured. It would be a good idea to have an X-ray census of all the people in Australia, but it seemed impracticable, although necessary. Such a survey would show which group of subjects would need particular care. In regard to age there were two alternatives: (i) everybody should be examined; (ii) people should be examined at the ages of 15, 20 and 25 years. The Mantoux test could be used to sort out the sheep from the goats, and public money need not be wasted on radiological examinations of those who had not been infected. Those children who left school at the age of 15 years would be tested at the ages of 15, 20 and 25 years.

Senator Cooper then referred to the change of plan of the military authorities. He asked whether the change had been sudden, and whether it had been made for any reason. Dr. Hughes replied that there was a reason, which had hardly been given, but had been deduced. It depended on the fact that all entrants to the navy, army and air force had been radiologically examined, but not the Militia. Suddenly the Militia men were to be transferred to battle stations, and evidently military reasoning said that they should be radiologically examined beforehand. Some of the men were found to have tuberculosis, and they had already served in the army for fifteen months and become potential claimants on account of aggravation of their condition. They had to be referred to the Repatriation Department, which investigated them, and put up a standard that no man was to be regarded as tuberculous on the results of X-ray examination alone; either tubercle bacilli must be found in two specimens of sputum, or tubercle bacilli from his sputum must kill a guinea-pig. Dr. Hughes thought that such a standard was a retrogression to the early eighties; it was not a modern, scientific approach to the problem of tuberculosis. When men were referred back to the department, they were put on the track of claiming a pension. The army was now sending such men directly to the Repatriation Department for investigation. If any of the applicants produced two specimens of sputum containing tubercle bacilli, they should be referred to the Department of Public Health, which would be able to trace their families. If the diagnosis was made only on the X-ray appearances, they went into the limbo of forgotten things. After that the army issued a statement that no man was to be labelled tuberculous unless a full investigation was made and unless he produced two specimens of sputum containing tubercle bacilli or the guinea-pig test produced a positive result. That statement meant that the man with early symptomless tuberculosis had passed by the department, which had received no such patients for months. They were sent by the army to their private doctor, and were not told that they had tuberculosis, but that they had "chest trouble".

In reply to a further question by Senator Cooper, Dr. Hughes said that he thought there had been an increase of 200 cases *per annum* owing to wartime investigation; before the war the department dealt with about 2,000 cases *per annum*. The patients were chiefly males; the female population had hardly been touched.

Senator Cooper said that he was trying to get at how many patients could be discovered by compulsory testing. Dr. Hughes said that what he had said did not apply only to the Militia; any man going into any of the fighting forces and diagnosed as suffering from tuberculosis by X-ray examination was referred to the Department of Public Health. These men were nearly all symptomless and apparently in good health.

Senator Cooper then asked whether such men going back to civil life in ordinary peace time received any preference—whether they were helped to find suitable employment. Dr. Hughes said that nothing was done for them in peace time. For a middle-aged man with three children, the only hope was the invalid pension, in addition to a food allowance for his wife, child endowment *et cetera*. If such patients supplemented their income by working, they lost their pensions. The only help was Picton Lakes Settlement. There such a man could live rent free in a furnished cottage; light was provided and his milk supply was supplemented, and he could keep his pension; but there was no industry there—all he could do was to grow flowers and vegetables. In Australia there were only two such settlements—Picton Lakes and one in South Australia at which there was some industry in operation. In peace time there were no manpower authorities to approach; a man was dependent on his "boss", and dared not say he was tuberculous. But now the manpower authorities took care of the men and they were back in circulation.

Asked by Senator Cooper the number for whom Picton Lakes catered, Dr. Hughes said it could take 12 bachelors and 19 married men. The results were good in some cases and bad in others. Picton Lakes could never be a successful rehabilitation centre unless some suitable industry could be established there.

Senator Cooper then referred to the patient with chronic tuberculosis, and asked what was the prospect for him. Dr. Hughes said that his lesion was likely to break down again.

Senator Cooper then asked whether the economic factor was largely to blame for the high incidence of tuberculosis. Dr. Hughes said that such was not the case; it was a wrong way to look at the problem. The need was to find the cases early—early in the disease and early in age. They should concentrate on youth; when young people affected by tuberculosis could be induced to go to sanatoria for treatment, good results could be obtained. That was where the economic factor came in; the patient could be given peace of mind while he was in the sanatorium if he knew that financial help would be given to his family. As things were, when he entered a sanatorium he took his 25s. per week pension with him and deprived his family of it; 16s. 6d. was taken from it for his keep, so that he had only about 8s. left.

If a compulsory system was introduced the Government would naturally have to look after the patient's family. It would have to be stressed that a tuberculous patient must be kept under supervision and under treatment.

Senator Cooper asked whether the patient put off treatment in order not to lose his job. Dr. Hughes said that such was not the case; he thought it was more a matter of individual resistance to tuberculosis. Some men with advanced tuberculosis had been able to continue working with very few symptoms, and even in entire ignorance of the fact that they were affected with tuberculosis. Few men would take the risk of infecting their families if they knew they had tuberculosis. In Sydney there were six anti-tuberculosis clinics; there was one at Newcastle and one at Broken Hill. There were none in country centres.

Mr. Perkins asked whether climate was important. Dr. Hughes said that its importance was a myth, except that the patient with tuberculosis in the middle or late stages did badly at a high altitude. At the health department they did not send such patients to the mountains; they did better in Randwick Auxiliary Hospital.

Mr. Perkins then asked whether any new buildings would be necessary. Dr. Hughes said that he had given the subject no thought. But if there was a possibility of using any building as a hospital, then it could be used as a tuberculosis hospital. No special design was necessary, except that small wards of about eight beds were desirable, and that there must be an X-ray plant, an operating theatre and a laboratory. A large building could quite well be utilized.

Asked by Mr. Perkins how many beds in the hospital would be necessary, Dr. Hughes said that he thought the 400-bed type of hospital was the best, though it became a little cumbersome later on. The patient with tuberculosis in the late stage should be admitted to hospital and given bed rest, and then sent to a sanatorium. But actually things were done back to front; the patient with an early lesion was sent to a sanatorium. There was opposition among the general public to the vicinity of a tuberculous patient, but he was not a leper. No harm was done by the establishment of tuberculosis hospitals in populated centres; they should be within easy reach of specialist services.

In answer to a question by Mr. Perkins, Dr. Hughes said that they could not afford to be "choosy" about the nurses employed in institutions for the treatment of tuberculous patients. In a sanatorium there were several fully trained nurses, who were assisted by several young probationer helpers. At Randwick all the nurses had to be aged over 30 years; they were all radiologically examined, and no nurse was accepted who showed any sign of tuberculosis.

Dr. Hughes said that climate or occupation had nothing to do with the incidence of tuberculosis. Some areas had a far higher percentage of notified cases of tuberculosis, but that should not be taken too seriously. In the wealthier suburbs patients might be seen by private medical practitioners, and it was not compulsory to notify the Board of Health of their existence. In crowded areas many cases of tuberculosis were found. There had been a surprising increase in the number of cases of tuberculosis from some seaside suburbs, and Dr. Hughes wondered why this should be. The building of better homes and the ensuring of better conditions of living would have a great effect. If a child of tuberculous parents was left in bad living conditions, he was likely to contract pleurisy or pneumonia, which was the first step on the downward grade.

Mr. Perkins asked whether country hospitals had special wards for tuberculous patients. Dr. Hughes replied that Newcastle Hospital had always done so. But the Board of Health emphasized that it would not bring bedridden tuberculous patients from the country to the city; country hospitals had to make provision for such patients. Screens could be put round the patients. It was no use putting up special wards, because there was no information on the number of cases of tuberculosis in any rural district. The Board of Health transported only ambulatory tuberculous patients.

Colonel Ryan referred to what Dr. Hughes had said with regard to the X-ray examinations carried out by doctors in Macquarie Street between the hours of 4.30 and 6.30 p.m., at a cost of 10s. 6d. per person, and asked whether the cost could not be reduced by the use of mass methods. Dr.

Hughes replied that the examinations were done by mass methods, and that anyone who had no money could be sent to the Anti-Tuberculosis Dispensary and radiologically examined for nothing. Inquiries were made into the financial status of everyone presenting himself at any public hospital, and in the city of Sydney it was possible for everybody to be examined. In South Australia X-ray examinations were being made without loss for a charge of 2s. 6d. It should be possible to do the same anywhere once the plant had been bought; it had to be a good one.

In reply to a further question, Dr. Hughes said that the families of tuberculous patients were on the whole willing to cooperate and be examined in New South Wales. He thought that the population would respond to a demand for a compulsory test of everyone, especially since the war. An astonishing number of cases had been found among young men in the armed forces, and Dr. Hughes thought that the same would apply to the women's services.

Colonel Ryan asked how many patients were represented by 1,000 deaths *per annum*. Dr. Hughes replied that the tuberculosis division had been established in 1928, and that there were about 15,000 current tuberculosis people in New South Wales. The death rate was a little less than one in sixteen.

Colonel Ryan asked whether the disease would progress much in the intervals if people were examined every five years between the ages of 15 and 25 years. Dr. Hughes said that the disease could make considerable progress, and that such a method of examination was not ideal if applied to the relatives or descendants of a tuberculous person; more frequent examination was necessary.

Asked by Colonel Ryan what sort of employment would be suitable for a tuberculous person, Dr. Hughes said that such a person could do office work, as a clerk, or be a shop assistant so long as he did not handle foodstuffs. There was quite a team of young tuberculous people with artificial pneumothoraces having refills who were carrying on their jobs. There was no danger; they had no tubercle bacilli in their sputum, and they had spent time in sanatoria and had learnt to protect other people. An indoor job did not put them back; but jobs on the land were not light jobs—they were wrong jobs for tuberculous patients. Dr. Hughes went on to say that for the past seven to nine years, since he had been in charge of the tuberculosis division, he had advocated that tuberculous patients should be very chary of going to a country town.

Colonel Ryan then asked Dr. Hughes what he thought of the possibility of doing something at once, and whether he had any ideas on the subject. Dr. Hughes said that he felt that if the armed forces continued to examine their men radiologically and sent those suspected of tuberculosis to the tuberculosis division, the division would be able to continue to do good. But there was an imperative need for beds.

Asked by Colonel Ryan whether there was anything that could usefully be done in extending the scope of examination, Dr. Hughes said that if the number of beds could not be increased, they could carry on a general programme of education in the city and country by poster, radio *et cetera*. People would be interested and would learn that they needed to keep their children under supervision.

In answer to a question by Colonel Ryan as to whether tuberculosis was a disease of poverty, Dr. Hughes said that there had been too much vagueness in talk about the subject. They were told that tuberculosis came from poor, industrial suburbs; but they did not know how much tuberculosis came from wealthier suburbs. They should be careful of making broad statements not based on facts or figures. However, Dr. Hughes did not wish it to be inferred that he was not in favour of the raising of the standard of living of the population as a means of stamping out the disease; but with regard to tuberculosis, he wished particularly to stress his conviction that the important thing was to contact early sufferers. Asked whether there was any country in the world where tuberculosis did not exist, Dr.Hughes said that he did not think so, except perhaps Iceland. The Australian aborigines were a problem, because they contracted tuberculosis so easily from white men.

Senator Arnold asked whether there was any scheme in any other part of the world that would do what was necessary—anything that had not been tried in Australia. Dr. Hughes replied that everything had been tried in Australia, except perhaps the use of "B.C.G." vaccine. Some authorities held that good results followed its use; others held that it accomplished nothing.

Senator Arnold then asked whether the economic factor was the main lack, and whether the provision of adequate financial support to the tuberculous patient would be of the greatest help. Dr. Hughes agreed that all tuberculous patients needed adequate financial support, but the provision of such support should be contingent on their continuing to carry on their treatment. Dr. Hughes said that his views were different from those of most authorities; they held that finance was the most important point. He considered that it was wrong to think along those lines; they should go for the young man who did not need financial support. The middle-aged person needed it. But they should think in terms of youth. The age of 15 years was early enough on the average to make a start. Some people in other parts of the world thought that girls should be examined much earlier. As a broad scheme, Dr. Hughes thought that a child should be examined when he was leaving school.

Senator Arnold asked whether, among children found to be infected at the age of 15 years, it was possible to state what percentage of cures could be made. Dr. Hughes said that the question was too difficult; but practically all the lesions would be early, and therefore curable. Asked by Senator Arnold how long cure would be likely to take, Dr. Hughes said that he told every patient whom he saw, particularly those with early lesions, that he must give up twelve months of his life for a cure. In answer to a further question by Senator Arnold, Dr. Hughes said that a person cured of tuberculosis could become reinfected, and that was where the economic factor was important. People who became reinfected had probably between the ages of 35 and 45 come up against want, overcrowding and poor food.

Senator Arnold then referred to the fact that the X-ray examination in Adelaide was carried out for 2s. 6d., and asked whether if it were a State matter it could be done more cheaply. Dr. Hughes said that he thought so; but there were two points to be considered. The films used in Adelaide, by the army and in the New South Wales survey were strip films; the American army used films measuring four inches by five inches, and the cost of that method was greater than the cost of the other. Both methods were in use in Sydney by different groups of radiologists. Senator Arnold asked whether the skiagrams on the larger films were better. Dr. Hughes said that there were two different opinions on the point. They had been using the small films in Sydney for about two and a half years, and it had been suggested that they should try the other method. In his opinion the value of the use of the larger film was that it was possible to give the patient his skiagram; if the patient had spent time in a sanatorium, he would want to send the record back to the superintendent of the sanatorium, so that the superintendent could follow his progress. In Dr. Hughes's opinion the use of the small films gave an adequate picture; he was sure that in New South Wales the examination over a period of three years of 5,000 people had been of value. They had perhaps made some errors, but only a small percentage. There was a clinic in Surry Hills that used the method, and recently it had been introduced at Sydney Hospital. Senator Arnold asked whether on a mass scheme the cost would be much less than 2s. 6d. Dr. Hughes said that the cost would possibly be less than 2s. 6d.; he referred Senator Arnold to papers on the subject published in THE MEDICAL JOURNAL OF AUSTRALIA about two years earlier. Dr. Hughes thought that figures were fallible, and that they should allow for various extra expenses as well. Asked by Senator Arnold whether the method was not a very quick one, Dr. Hughes said that it was; but the radiologists doing the examining between 4.30 and 6.40 p.m. had asked that not more than fifty patients should be sent for examination in that period.

Asked by Senator Arnold whether a radiological survey of the whole of the population would need a very elaborate set-up, Dr. Hughes said that a very elaborate plant and expert readers of films would be needed, but apart from that it would be simply a routine matter. Dr. Hughes thought that no insuperable difficulty would be met with if it was decided to proceed with the scheme, if the public was educated and made interested in it. Asked by Senator Arnold whether propaganda was the main thing, Dr. Hughes said that personally he liked a voluntary system; but as an officer of the tuberculosis division he would like to compel everybody in the State to be examined at once. Dr. Hughes was certain that people would hang back from such a survey if they were likely to lose their jobs as the result of the discovery that they had tuberculosis; that was the difficulty in industrial surveys. People's livelihoods would depend on the results, especially if a person with an early tuberculous lesion was found to be employed in handling foodstuffs. Senator Arnold then asked whether Dr. Hughes would be afraid that that would defeat the ends it had been intended to accomplish. Dr. Hughes said that the difficulty could be overcome. The main thing was to induce everybody to be examined. The Mantoux test had been applied to about

thirty people in about fifteen minutes at a peak period. Dr. Hughes thought it would be a good idea to apply the test to school children, to cull out the few with tuberculosis who were normally missed. The test was an indication of infection with tuberculosis; the disease symptoms were an indication of affection with tuberculosis. Practically all city dwellers would show infection, but not affection. One advantage of the Mantoux test would be that it would show those whom it would be necessary to examine radiologically. The test could be applied to children at any age. An ideal scheme would be to apply the skin test at regular intervals, and if a positive result was obtained, to examine the child radiologically.

Senator Arnold then asked Dr. Hughes whether he considered that the milk supply in the city of Sydney was free from tuberculosis. Dr. Hughes replied that there was very little bovine tuberculosis in New South Wales or in Australia. The human type was more common.

Asked by Senator Arnold whether a man employed in handling foodstuffs had to leave his employment if he was found to be suffering from tuberculosis, Dr. Hughes said that he had to leave at once. Senator Arnold then asked whether there would be any danger of infection from articles made by tuberculous patients; he referred particularly to what would happen if an industry was set up in a rural area for such patients. Dr. Hughes said that articles made by tuberculous patients were not harmful to other people if they were exposed to sunshine for forty-eight hours; the germ of tuberculosis could not live longer in bright sunshine. Dr. Hughes thought that any prejudice against such articles could be removed by education of the public. The toy industry was one that would be suitable.

The Chairman then asked whether Dr. Hughes considered that the X-ray equipment could be handled by local authorities—municipal councils *et cetera*. Dr. Hughes replied that he did not think so; it would have to be under the care of someone with experience. In reply to another question by the Chairman, Dr. Hughes said that the taking of the X-ray picture would have to be done by an expert. The Chairman then asked whether it was likely that after the war there would be a surplus of X-ray equipment that could be used for the purpose under discussion. Dr. Hughes thought that there would be; there were X-ray facilities in most large military hospitals.

Dr. Hughes then said that there was one point to which he had not referred, and that was a statement made by Dr. Holmes, in the report of the National Health and Medical Research Council, with regard to tuberculosis in pregnancy. Dr. Hughes considered that in a midwifery hospital all women entering for a confinement should be radiologically examined. The Chairman asked how that could be done. Dr. Hughes replied that most city hospitals had X-ray plants, and that such a procedure would be most helpful to the nation.

The Chairman then asked whether Dr. Hughes placed much importance on the detection and care of patients suffering from tuberculosis; whether, in effect, he thought that an X-ray photograph should be obtained, and that then the patient should be admitted to hospital and be given clinical treatment. Dr. Hughes said that he was in agreement with that course of action.

Correspondence.

THE STATE TUBERCULOSIS SERVICE IN NEW SOUTH WALES.

SIR: Your readers will be well aware that there is not sufficient hospital accommodation available in New South Wales for persons suffering from pulmonary tuberculosis who urgently require it. They may not be aware that the position is now very much worse than it has ever been before: the sum of human suffering and hardship caused by it and the menace to the public health entailed by it are also, of course, very much greater than ever before. I will quote just two illustrative examples of what is happening.

A working man, fifty years of age, whose failing health was restored at a sanatorium ten years ago, was thereafter able to earn his living despite smouldering tuberculous disease in one of his lungs. Recently he suffered a bereavement; after it he lost more than a stone in weight and the disease in his lung flared up again. Although he gave up work and rested at home he remained poorly and I recommended him for admission to Waterfall Sanatorium. He was told at the Health Department that he would have to wait at least six months for admission.

A girl, twenty-three years of age, was ill with tuberculosis of both lungs; but I thought her health capable of very great improvement. The Health Department sister reported to me that the conditions at her home were so unsuitable that it was very undesirable to keep her there. I accordingly recommended her for admission to Randwick Auxiliary Hospital; but the mother was told at the Health Department that she would have to wait at least two months for admission. The girl's health is declining.

A redeeming feature of the position is the splendid, tireless work done by the visiting sisters, helping, advising, encouraging and pacifying these unhappy, restless, frightened, clamorous, leaderless people.

Why is the hospital accommodation for tuberculosis so straitened? At Randwick Auxiliary Hospital I understand that a ward of 30 beds is kept empty because of shortage of nursing and domestic staffs. At Waterfall Sanatorium I understand that 20 to 30 beds are kept empty for the same reason. "Bodington", the Red Cross Sanatorium, now takes in only ex-servicemen, so that although there are many empty beds there the number of beds available for male civilians is reduced by 85. The new tuberculosis ward at the Royal North Shore Hospital has been diverted to another purpose and has never been occupied by tuberculous patients.

What is the Health Department doing to provide hospital accommodation for sufferers from tuberculosis who need it but cannot get it until they have endured a waiting period during which their lungs sustain grave damage? It has been reported in the newspapers that £150,000 which was to have built a large chest hospital was relinquished by the Health Department and spent in 1942 on air-raid precautions: it is likely to be years before this money is forthcoming again. So far as I am aware the Health Department has done nothing whatever apart from inserting advertisements in the "situations vacant" columns of the newspapers to obtain the staff to make usable the accommodation at its tuberculosis hospitals.

What can be done to save the situation? Could not the Minister himself handle this matter? First, with regard to the domestic service: it requires a campaign conducted with imagination and vigour (like some of those conducted by his colleague the Minister for National Emergency Services) to improve the conditions of service, stimulate *esprit de corps* and organize a fine, well-paid cadre of picked volunteer workers for this essential department. With regard to the nursing service, similar measures would not be enough, because sufficient nurses are just not available. I have been hearing suggestions that nurses be "called up" for service in hospitals and institutions; but I rather think that any attempt to impress them for this purpose could be defeated at law, as the law now stands and seems likely to stand. However, it would be easy for the State to vest power in the Public Service Board to transfer nurses (and domestic staff) from any State hospital to any other State hospital: in this way nurses (and domestic staff) over the age of twenty-five years (medically selected to ensure their safety) could be transferred to tuberculosis hospitals from hospitals where many of the patients are neither very ill nor capable of spreading infection. Simultaneously the *Nurses Registration Act* could also be amended like the *Medical Practitioners Act* in such a way as to withhold from newly registered nurses legal qualification to practise their profession at large until they had practised for twelve months at an approved hospital. In this way any deficiencies existing on the staffs of the State's general hospitals or created by transfers to tuberculosis hospitals could be made up: it would also do much to relieve the hardships now being endured by sick people in country districts owing to the shortage or lack of nurses at country hospitals.

I am told that measures like these might divert prospective entrants from the nursing profession at a time when every single one is needed: I do not think so myself, although I do think that the nursing profession could be made more attractive to prospective entrants. I am also told that coercive measures such as I have suggested, even though they be only mildly so, are distasteful and would arouse opposition and be politically inexpedient, and that in view of these objections there are not pressing enough indications for the use of legislative methods hitherto foreign to us—the redemption of a few hundreds of broken people, some of them doubtless beyond hope of full rehabilitation, and the removal of a menace to the public health that is said to exist but which no one can measure. Well, if that is public policy, we must continue the sad fight with just what we have. Soon, no doubt, the Commonwealth, which has already led the world so brilliantly in the prophylaxis of

tuberculosis in the military sphere, may be persuaded actively to extend to the whole of the Australian people the benefits of its experience, accompanying prophylaxis and diagnosis with a medical, nursing, hospital and social service for the tuberculous, a resounding entry into real national medicine that will make the welkin ring and pave the way for more and more good work for a healthy Australia.

Yours, etc.,

185, Macquarie Street, Sydney,
January 11, 1943.

DOUGLAS ANDERSON.

ANTI-RH AGGLUTININS.

SIR: While reading the excellent article in the supplement to the journal of January 9 entitled "The Supply and Use of Blood and Blood Substitutes", I noticed one matter referring to the Rh factor on which I would like to comment. The article reads: "The agglutinin is usually most active at low temperatures, and therefore . . . a special cross-matching test is done with cooled reagents."

Levine, on the other hand, says: "In many instances anti-Rh agglutinins react far better at 37° C. than at lower temperatures. For this reason the term 'warm agglutinin' was applied to them. In this respect they differ from the agglutinins of the grouping sera and other atypical agglutinins." He is supported in this view by Katzin, Burnham and Englewood.

For this reason also, Levine has devised a modified cross-matching technique in which the patient's serum and donor's cells are incubated for thirty minutes at 37° C. and then centrifuged at low speed (500 r.p.m.) for one minute before reading.

This fact assumes importance in using the most sensitive technique to detect incompatibilities. Of importance also is the building up of supplies of anti-Rh serum for testing, and I would be very grateful if any practitioner could either send me serum from or inform me of any woman who has recently been delivered of an infant suffering from *hydrops fœtalis, icterus gravis neonatorum* or congenital anæmia.

Yours, etc.,

Brisbane Hospital, Brisbane,
January 18, 1943.

NOEL R. HENRY, B.Sc., Bacteriologist.

SIR: I am sure that all your readers appreciate the timely and authoritative series of articles on war medicine and surgery, published as supplements to this journal under the direction of the National Health and Medical Research Council. I should like to question a statement about the anti-Rh agglutinin which occurs in the article on "The Supply and Use of Blood and Blood Substitutes" (Number 6, January 9, 1943). The statement is: "The [anti-Rh] agglutinin is usually most active at *low* temperatures, and, therefore, when a transfusion is to be given to a pregnant or puerperal woman, or to someone who has recently received a transfusion, a special cross-matching test is done with *cooled* reagents." (The italics are mine.) This seems to be at variance with the findings of Levine and his associates,[1] who recommend that the modified compatibility test should be performed at 37° C. Levine writes: "The anti-Rh agglutinins, especially in the pregnancy cases, were observed to react far better at 37° C. than at 20° C. (low room temperature). Consequently the term 'warm agglutinin' was applied to them by Levine, Katzin and Burnham. This property differentiates the anti-Rh agglutinins from other atypical iso-agglutinins. . . . These considerations suggested a modification of the compatibility test; i.e., incubation of patient's serum and donor's red cells at 37° C. for about 30 minutes followed by centrifugation for one minute at about 500 revolutions per minute and resuspension of the sedimented cells."

It is true that L. E. H. Whitby[2] in a review of "The Hazards of Transfusion" states that cross-matching tests when the anti-Rh agglutinin may be present should be performed at a low temperature; giving references to two articles, one by A. S. Wiener,[3] the other by J. E. Scott and J. S. Conant. Wiener's article describes a series of hæmolytic reactions following transfusion, in three of which iso-antibodies "corresponding to the property Rh" were detected in the patient's serum. In the first case Wiener used a special "cold" technique, since he and H. R. Peters had found this useful on a previous occasion; in the other two he found that "reactions at low temperatures were indistinct while those at room or body temperature gave clear-cut results". The record of a single case of iso-agglutination, by Scott and Conant, seems to be Whitby's only authority for the statement that "this [that is, the process of iso-immunization] apparently occurs gradually, the agglutinin being at first weak, next active only in the cold and lastly active at 37° Centigrade".

In a series of articles published at about the same time as Whitby's, Wiener[5] recommends Levine's incubator technique, and states that "Human anti-Rh sera, particularly those obtained from mothers of erythroblastic infants, usually react most intensely at body temperature, as has been pointed out by Levine; in fact, with many such sera, when tests are carried out at refrigerator temperature, little or no clumping occurs". Thus the consensus of opinion at present is that the anti-Rh agglutinin in human sera is a "warm agglutinin". The ideal thing would be to perform tests at several different temperatures, and in fact Wiener[6] has suggested this, but it is not always practicable. The important thing in regard to the anti-Rh agglutinin seems at present to be the test performed at body temperature. But no doubt there is still much to be learned about the intricate subject of iso-agglutination.

Yours, etc.,

Royal North Shore Hospital, St. Leonards, Sydney.
January 18, 1943.

BEATRIX DURIE.

References.

(1) P. Levine: "The Role of Iso-agglutination in Transfusion Accidents and in the Pathogenesis of Erythroblastosis Fœtalis", *American Journal of Clinical Pathology*, Volume XI, December, 1941, page 1.

(2) L. E. H. Whitby: "The Hazards of Transfusion", *The Lancet*, Volume I, May 16, 1942, page 581.

(3) A. S. Wiener: "Hemolytic Reactions following Transfusions of Blood of the Homologous Group", *Archives of Pathology*, Volume XXXII, August, 1941, page 227.

(4) J. E. Scott and J. S. Conant: "Successful Transfusions following a Previous Hemolytic Transfusion Reaction due to Rh and Anti-Rh Factors. Report of Case", *American Journal of Clinical Pathology*, Volume II, 1941, page 536.

(5) A. S. Wiener and H. R. Peters: "Hemolytic Reactions following Transfusions of Blood of the Homologous Group, with Three Cases in which the Same Agglutinogen was Responsible", *Annals of Internal Medicine*, June, 1940, page 2306.

(6) A. S. Wiener: "Hemolytic Transfusion Reactions", *American Journal of Clinical Pathology*, Volume XII, 1942, pages 189, 241, 202.

A SALARIED MEDICAL SERVICE.

SIR: I am very sorry to learn that Dr. Hewitt found it difficult to understand the aphorism he has quoted: "I for one should hate for a wage to sell health across the counter to my clients." The address was prepared to be spoken and emphasis was placed on the qualifying phrase "for a wage".

A wage is a servant's periodical pay, but a fee is a professional man's pay or gratuity. The truth of the aphorism depends on the distinction between dependence as a servant and independence as a professional adviser. I am keen on the preservation of sturdy independence in the curative field of medical practice.

Yours, etc.,

14, Collins Street, Melbourne, C.1,
January 19, 1943.

H. BOYD GRAHAM.

SIR: THE MEDICAL JOURNAL OF AUSTRALIA of January 23, 1943, contains an interesting letter, in which a group of five correspondents states: "the profession in Britain, the members of which have had intimate contact for a generation with governmental regulation of medicine, is resolved by a majority of nine to one against absorption into a government medical service". The writers regard this as "a most impressive fact".

It is important to remember, however, that the above statement is not an observed fact at all, but an assumption. The assumption is that the votes of 207 delegates, at an annual representative meeting of the British Medical Association, can be taken as giving the opinion of 55,000 members of the medical profession. This assumption may

be true, but it at least requires examination, especially as some 25% of medical practitioners in Britain are not members of the British Medical Association.

In any case, opinion in Australia may well be quite different, since Sir Raphael Cilento reported in THE MEDICAL JOURNAL OF AUSTRALIA of March 28, 1942, that 69% of the medical profession in Queensland were willing to accept unconditional employment in a State medical service.

Yours, etc.,

Wesley College, University of Sydney, January 27, 1943. COLIN WHITE.

THE FUTURE OF MEDICAL PRACTICE.

SIR: In his fanatically emotional advocacy of a salaried service in THE MEDICAL JOURNAL OF AUSTRALIA of January 16, 1943, Dr. L. Hewitt complains of considerable difficulty in following Dr. Boyd Graham's address to the Victorian Association. In turn I find difficulty in seeing any point in his own theatrical invitation to the profession to "note well the fact that two cremation certificates a day would pay our income tax". Only the blind amongst us could fail to note that powerful forces are at work at the moment to alter the form of medical practice in this country. Unfortunately one cannot escape the conclusion that political opportunism—"something for nothing" to gloss over unpopular administrative records as elections approach—rather than genuine conviction of the need for revolutionary change is one of the most potent of these forces.

It is necessary for us, as trained and independent minds, to maintain a sense of balance in our consideration of the various schemes and viewpoints put before us. Only those completely devoid of this sense will fail to see a great deal of good in the system in operation today.

Yours, etc.,

33, Fort Street, Petersham, January 20, 1943. K. F. TARLINGTON.

SIR: All who have learned the need to guard the privileges of freedom which we as private medical practitioners enjoy, will have read with much satisfaction the inspiring letter of Dr. H. R. Grieve of January 16, 1943.

But I would like to point out to Dr. Grieve that he castigates the Jeremiahs without just cause, seeing that socialization of the medical profession already now is in existence. *Vide* the following letter enclosed which I have received from Dr. W. G. D. Upjohn.

[COPY.]

Dear Dr. Dane,

In reply to your letter of 3rd inst. I would state that the *National Security Act* is limited in time by Section 19 as follows:

"This Act shall continue in operation during the present state of war and for a period of six months thereafter and no longer."

As you stated in your letter it is possible under the present state to socialise the medical profession, but I do not think that this is either facilitated or made difficult by a practitioner joining or refraining from joining the Emergency Civil Medical Practitioner Service.

Yours faithfully,

(Sgd.) W. D. UPJOHN,
Executive Officer, State Medical Co-ordination Committee.

This was written in reply to one in which I pointed out to Dr. Upjohn that socialization had been brought about by the regulations under the *National Security Act*.

As far as the limiting clause is concerned, I understand that high legal authority has advised that it is *ultra vires*—and further, we all know how difficult it is to change or abrogate legislative enactment once such has been in force.

There can be no doubt that the profession is now socialized, but that is not to say beaten. There is time yet for it to rouse itself from its apathy and fight the small body of socialists who, however honest their purpose, wish to make us all civil servants on a salary and a pension.

The fight will now be harder than it might have been had there been more vigilance in our leaders.

Yours, etc.,

PAUL G. DANE.

111, Collins Street, Melbourne, January 20, 1943.

BEE STINGS, MALARIA AND CHLOROFORM.

SIR: I have just read an article on bee stings by Dr. Jex Blake and other letters in the *British Medical Journal* for September and October last.

I think perhaps a discovery I made some years ago may be useful in places like Rhodesia where bees are particularly vicious. The discovery, which may or may not be original, is that bees detest chloroform above all things; even a small quantity added to a vapour spray like "Flytox" or "Flit" (which alone are almost valueless) will cause ordinary bees to depart hurriedly, but for a very persistent swarm, it is necessary to add up to one-third chloroform.

A very determined swarm of bees once got under the roof of my country cottage; for days they resisted all the usual methods of expulsion and made themselves a great nuisance by filling the house as well; I then remembered chloroform. After half a dozen puffs with 30% chloroform the angry buzzing ceased, the bees stood not upon the order of their going but went. In less than five minutes the house and roof were clear, and they did not return.

All insects I find have similar phobia for chloroform. The very best prophylactic against sandfly and mosquito bites is a mixture of kerosene, oil of eucalyptus and chloroform in equal parts, smeared over the exposed skin. I have used this for some years on fishing expeditions, when camped out in Australia and New Zealand. It will keep one's bare arms and neck free from sandflies for several hours, and is almost as good as a mosquito net when sprinkled in a tent.

Sir Philip Manson-Bahr has recently stated that the mosquito net is the most valuable prophylactic against malaria. I suggest that a chloroform mixture in small individual containers issued to troops in malarial countries would be invaluable, and could be used when a net would be impracticable. A two-ounce bottle lasts many weeks. The incidence of malaria might then be considerably lowered, and the comfort and efficiency of fighting forces considerably enhanced.

Yours, etc.,

Wellington, New Zealand, Undated. H. P. PICKERILL.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 14, of January 21, 1943.

NAVAL FORCES OF THE COMMONWEALTH.

Permanent Naval Forces of the Commonwealth (Sea-Going Forces).

Extension of Appointment.—The appointment of Surgeon Lieutenant Trevor Alexander McLean is extended for a period of two years from 7th September, 1942.

Citizen Naval Forces of the Commonwealth.

Royal Australian Naval Reserve.

Appointment.—Edward Winston Freshney is appointed Surgeon Lieutenant, dated 12th December, 1942. (Amending Executive Minute No. 64 of 1942.)

ROYAL AUSTRALIAN AIR FORCE.

Citizen Air Force: Medical Branch.

Temporary Flight Lieutenant C. V. W. Brown (1467) is granted the acting rank of Squadron Leader whilst occupying a Squadron Leader post with effect from 1st November, 1942.

Reserve: Medical Branch.

The following are appointed to commissions on probation with the rank of Flight Lieutenant with effect from the dates indicated: John Boyd Craig, M.B., B.S. (7223) (19th November, 1942), James Bryan Foster, B.A., M.B., B.S. (7222), Cecil Brereton Colvin, M.B., B.S. (7224), James Lawrence Sinclair, M.B., B.S. (7225), James Howard Stewart Waters, M.B., B.S. (7226), 30th November, 1942; Derrick Scanlan, M.B. (7221), 2nd December, 1942.—(Ex. Min. No. 10—Approved 14th January, 1943.)

CASUALTIES.

According to the casualty list received on January 25, 1943, the undermentioned, who were previously reported missing, are now reported to be prisoners of war: Captain G. F. Braby, A.A.M.C., Maribyrnong; Major K. B. Burnside, A.A.M.C., Toorak; Captain A. R. Bush, A.A.M.C., Melbourne; Major J. F. J. Cade, A.A.M.C., Bundoora; Captain F. J. Cahill, A.A.M.C., Flemington; Major I. T. Cameron, A.A.M.C., Croydon; Captain J. P. Catchlove, A.A.M.C., Elwood; Captain V. A. Conlon, A.A.M.C., Lockhart, New South Wales; Major T. P. Crankshaw, A.A.M.C., Malvern; Captain W. Dixon, A.A.M.C., Elwood; Captain E. B. Dreverman, A.A.M.C., Armidale; Major R. G. M. Forsyth, A.A.M.C., Burnley.

According to the casualty list received on January 27, 1943, Major B. A. Hunt, A.A.M.C., of Cottesloe, and Captain H. F. Tucker, A.A.M.C., of Toorak, who were previously reported missing, are now reported to be prisoners of war.

According to the casualty list received on January 28, 1943, Major K. J. Fagan, A.A.M.C., of Bookham, who was previously reported missing, is now reported to be a prisoner of war.

According to the casualty list received on February 1, 1943, Captain V. E. Sampson, A.A.M.C., of Melbourne, is reported to have been wounded in action, remaining on duty.

Obituary.

FITZWALTER MAURICE READ.

We regret to announce the death of Dr. Fitzwalter Maurice Read, which occurred on January 24, 1943, at Canterbury, Victoria.

ARTHUR EDWARD SYME.

We regret to announce the death of Dr. Arthur Edward Syme, which occurred on January 27, 1943, at Melbourne.

Nominations and Elections.

The undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Priddis, Kevin Walter, M.B., B.S., 1938 (Univ. Sydney), Box 94, Coonabarabran.

Medical Appointments.

The undermentioned have been appointed to be Resident Medical Officers at the Royal Adelaide Hospital, South Australia: Dr. Dorothy Kathleen Ross Anderson, Dr. Franz Bauer, Dr. Harold Stewart Blackburn, Dr. Michael Dean Dawson, Dr. Thomas Pearce Dearlove, Dr. Philip Sydney Eyles, Dr. Philippa Margaret Gardiner, Dr. Donald Kerr Grant, Dr. John Irving Guenther, Dr. Dennis Francis Hannon, Dr. David Hall Harris, Dr. Colin Thomas James, Dr. Daintrey Ned Kekwick, Dr. Ruth Lyons, Dr. John Stewart McKellar-Stewart, Dr. James Herschel Nicholls, Dr. Arthur Dudley Packer, Dr. Kingsley Clarence Porter, Dr. Norman Alfred Richards, Dr. Henry George Rischbieth, Dr. Ronald John Sawers, Dr. Reginald Roberts Sobey, Dr. Robert Thornborough Steele, Dr. Cyril David Swaine, Dr. Donald Lancelot Wilhelm.

Books Received.

"Minor Medicine", edited by Sir Humphry Rolleston, Bt., G.C.V.O., K.C.B., M.D., F.R.C.P., and Alan A. Moncrieff, M.D., F.R.C.P.; 1942. London: Eyre and Spottiswoode (Publishers) Limited. 8¾" × 5½", pp. 223, with 14 illustrations. Price: 16s.

"The 1942 Year Book of the Eye, Ear, Nose and Throat"; the Eye, by L. Bothman, M.D., the Ear, Nose and Throat, by S. J. Crowe, M.D., with the collaboration of E. M. Hagens, M.D. Chicago: The Year Book Publishers. 7" × 4½", pp. 640. Price: $3.00.

Diary for the Month.

FEB. 9.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
FEB. 12.—Queensland Branch, B.M.A.: Council.
FEB. 13.—Tasmanian Branch, B.M.A.: Annual Meeting.
FEB. 16.—New South Wales Branch, B.M.A.: Ethics Committee.
FEB. 23.—New South Wales Branch, B.M.A.: Medical Politics Committee.
FEB. 25.—South Australian Branch, B.M.A.: Branch.
FEB. 26.—Queensland Branch, B.M.A.: Council.
MAR. 2.—New South Wales Branch, B.M.A.: Organization and Science Committee.
MAR. 3.—Western Australian Branch, B.M.A.: Council.
MAR. 4.—New South Wales Branch, B.M.A.: Special Groups Committee.
MAR. 4.—South Australian Branch, B.M.A.: Council.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

Editorial Notices.

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